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# USSR Report

CHEMISTRY

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## ALKALOIDS

### POLYBUFFER SEPARATION OF TOTAL INDOLE ALKALOIDS FROM HERBACEOUS PERIWINKLE (VINCA HERBACEA WALDEST ET KIT.)

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 1, Jan 84  
(manuscript received 6 Aug 82) pp 67-71

VACHNADZE, V.Yu., MUDZHIRI, M.M., DZHAKELI, E.Z. CHKHIKVADZE, G.V. and MUDZHIRI, K.S., Institute of Pharmacology imeni I.G. Kutateladze, Georgian SSR, Academy of Sciences Tbilisi

[Abstract] Indole alkaloids are widespread in various periwinkle (Vinca) plants, and one particular species, herbaceous periwinkle (Vinca herbacea Waldest et Kit.) grows in Georgia, the Ukraine, and Crimea. In East Georgia, the Institute of Pharmacology imeni I.G. Kutateladze, Georgian SSR Academy of Sciences has a four-hectare plantation growing this plant. In the present work, a polybuffer method was devised to separate over 16 individual alkaloids from the roots of this plant. References 8: 7 Russian, 1 Western. [156-83440972]

### ALKALOIDS FROM CONIUM MACULATUM L.

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSKOY SSR in Russian Vol 26, No 8, Aug 83  
(manuscript received 20 Apr 83) pp 511-515

SADYKOV, Yu.D. and KHODZHIMATOV, M., Institute of Chemistry imeni V.I. Nikitin, Tajik SSR Academy of Sciences

[Abstract] "Boligolov", or Conium maculatum L. (also called tutatkali, Tutakalit, mushlak and shavkaron in Tajiki) grows along river banks, irrigation ditches, mountain slopes, and as weed in gardens throughout Tajikistan. The juice extracted from the leaves of this plant was used in folk medicine for breast cancer, uterine fibroma and epilepsy, while the fruit was used as a stomach remedy. A tea made from this plant was used to treat coronary attacks and as blood coagulant for vaginal bleeding. An extract was used to relieve pain resulting from rheumatism, muscle spasms and bruises. However, Boligolov is an extremely toxic plant which paralyses the central nervous system. A study was made of the composition and annual accumulation of alkaloids in this plant as collected at various stages, in the environs

of Dushanbe, from 1978 to 1981 in both the above and below ground portions. It was established that coniine, coniceine and conhydrine are present in *Conium maculatum* L. Coniine may be obtained from the fruit where most of the alkaloids (1.13-1.44%) are located. Several derivatives of coniine are also obtained. Figures 2; references 7 (Russian).  
[172-83440972]

UDC 661.183.1

SYNTHESIS AND PHYSICAL CHEMICAL PROPERTIES OF POLYMERIC PHOSPHINE OXIDE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 1, Jan 84  
(manuscript received 22 Jul 81) pp 123-127

LASKORIN, B.N., KIRSANOV, A.V., ZHUKOVA, N.G., FESHCHENKO, N.G., POLYAKOVA, O.P., KULISH, T.V., KOROL', O.I. and MAZEPA, I.K.

[Abstract] Trialkyl phosphine oxides are effective complexing agents used for extraction of heavy and rare-earth elements. Therefore, it was of interest to study polymer analogues of phosphine oxides. Macroporous copolymers of styrene and 10% divinylbenzene were synthesized as follows: iodine and red phosphorus were placed in the reaction vessel and heated to 130-150°C for 1 hr with stirring; then chloromethylated styrene was added at 100-120°C and heated for 25 hrs at 100-150°C with stirring; finally alkyl iodide was added at 60-120°C and left standing for 6-10 hrs at 90-110°C. After removal of excess  $P_2I_4$  and cooling to 30-40°C, the reaction product was treated with alkaline and sodium sulfite solution, filtered, washed and dried in vacuum at 50-100°C. These phosphine oxides were comparable to commercial products; they absorbed uranium from nitric acid solutions much better than copper, chromium or iron, thus being useful in analytical chemistry for determination of uranium in effluent, mineral ores etc. Figure 1; references 5 (Russian).  
[163-7813]

UDC 632.937.1

QUALITY CONTROL OF GRAIN INFESTATION BY ELECTRON PARAMAGNETIC RESONANCE

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSKOY SSR in Russian Vol 26, No 8, Aug 83  
(manuscript received 25 May 83) pp 506-510

SOLOZHENKIN, P.M., academician Tajik SSR Acad. Sci. MALYAVIN, I.S., SHALUKHINA, L.M., SEMENOV, Ye.V. and KRASNOVA, R.A., Institute of Chemistry imeni V.I. Nikitin, Tajik SSR Academy of Sciences; Tajik Experimental Forestry Station, Central Asian Scientific-Research Institute of Forestry; Tajik SSR Ministry of Procurement

[Abstract] Within the USSR Food Program measures taken to safeguard agricultural and forestry products are most significant, since grain losses

are still high. Since existing physical methods of grain infestation detection, i.e., flotation, macroluminescence, visual examination, are not entirely satisfactory, a method was developed that is based on the fact that biological systems, including grain and insects, possess paramagnetism. Electron paramagnetic resonance spectra were run on barley, wheat, oats, and peas samples, both healthy and infested with grain mold (*Sitotroga* (*Gelechia*), *cerealla* Oliv) and granary weevil (*Calandria granaria* L.). In all cases the intensity of the EPR spectra of the infested samples was greater than that of the healthy ones. This method of quality control can be used in grain storage elevators as well as in systematic monitoring during artificial thinning out of entomophages as applied in biological protection against plant pests. Figures 2; references 9 (Russian).  
[172-83440972]

UDC 774.341:111

#### STUDY OF FORMATION CONDITIONS OF POWDERY MATERIALS WITHOUT USE OF POLYMER BINDERS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 1, Jan-Feb 84  
(manuscript received 22 Apr 82) pp 114-117

ANTONOV, A.N., TIMONIN, V.A., FEDOSEYEV, S.D. and MAKEVNINA, L.F., All-Union Scientific Research Institute of Metal Protection from Corrosion

[Abstract] An attempt was made to obtain graphite materials from finely-dispersed graphites without addition of polymer thermoreactive binders. The goal was to obtain strong, elastic materials which would not layer or flake during prolonged storage and use. A method was developed based on rapid heating of graphite which produced material with a spiral-like, petalous microstructure and which was called expanded graphite. This material had a low bulk mass and high specific surface of the particles. Compression of the expanded graphite at 20°C and 10-100 MPa without any binders yielded an anisotropic graphite with elastic properties and low gas permeability along the compression axis. Expanded graphite may be used in preparation of explosion protective membranes, sealing gaskets, sealing rings, antifrictional components capable of good performance up to 400°C in various media like chlorine, phosgene, inorganic and organic acids, H<sub>2</sub>S, SO<sub>2</sub> or in ammonia. Industrial testing of equipment from expanded graphite showed that it can replace many metals and alloys. Figures 2; references 9: 8 Russian (1 by Western authors), 1 Western.  
[164-7813]

# STUDY OF STRUCTURAL AND PROPERTY CHANGES OF PYROLYTIC GRAPHITE RESULTING FROM NEUTRON IRRADIATION

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 1, Jan-Feb 84  
(manuscript received 30 Aug 82) pp 118-125

VIRGIL'YEV, Yu.S., KUROLENKIN, Ye.I. and MAKARCHENKO, V.G.

[Abstract] Changes in structural properties of pyrolytic graphite [crystalline lattice parameters, dimensions of coherent diffusion areas (CDA), texture indices etc] and its physical characteristics (strength, modulus of elasticity, microhardness, coefficient of heat expansion, electroconductivity, dimensional stability) were determined after exposure to neutron radiation. Industrial pyrographite with precipitation temperature 2300K was used in these studies. It was shown that large crystallites are broken down to smaller units by means of polygonization and some distortion. The initial "x-ray" texture was diminished, with fluence increase, while the anisotropy of the macroproperties was retained. Following changes were noted after low temperature (320-340 K) irradiation with up to  $10^{21}$  neutrons/cm<sup>2</sup>: lattice parameters *c* which were independent of the quality and texture of starting material dropped to 20-24%; dimensions in perpendicular direction by 10-15%; the coefficient of heat expansion showed a negative effect in the parallel direction to the *c* axis. The microhardness of pyrographite was directly related to its quality. The radiation effects were lowered with increased temperature. Annealing pyrographite specimens to microhardness or the modulus of resilience. Figures 4; references 9: 7 Russian, 2 Western. [164-7813]

UDC 543.46:681.2

# PHOTOIONIZATION METHOD AND DEVICE FOR GAS ANALYSIS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 1, Jan 84  
(manuscript received 11 Jan 83) pp 71-74

ALIYEV, T.B., Scientific Research and Design Institute for Comprehensive Automation in Petroleum Production, Sumgait

[Abstract] Photoionization for gas chromatography has the advantage of using nitrogen or even ordinary air as the gas carrier for gas ionization and analysis. The present article reports on a method using radiation from a high-frequency non-electrode charge in metal vapors, with varying spectral lamps of high intensity and stability. The detector was a special high-frequency non-electrode lamp, with a 5 mm inside diameter tube attached for measuring ionization flow. The charge was induced by placing the lamp in a generator coil with 50 MHz frequency. Various metal vapors, including mercury, cadmium and zinc, were tested. Intensive ultraviolet radiation increased the coefficient of ionization and the sensitivity of the detector. Results indicated that the detector's sensitivity to organic compounds with air and nitrogen as carriers equalled that of flame-ionization and helium detectors. Figures 3; references 9: 5 Russian, 4 Western. [167-12131]

EVALUATION OF RELIABILITY OF NETWORK LABORATORIES OF STATE COMMITTEE FOR  
HYDRO-METEOROLOGY IN MONITORING SOIL CONTAMINATION BY ORGANIC CHLORIDE  
PESTICIDES

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 1, Jan 84  
(manuscript received 25 Apr 82) pp 88-91

DYKHALIN, Yu.S., BABKINA, E.I. and KOVALEV, A.F., Institute of Experimental  
Meteorology, Obninsk

[Abstract] The USSR State Committee for Supervision and Monitoring of Soil  
Air, Environmental and Precipitation Pollution attempts to monitor levels  
of DDT, 4,4'-dichlorodiphenyldichlorethylene, and isomers of 1,2,3,4,5,6-  
hexachlorocyclohexane in the soil at various regional centers. The present  
article reports on attempts to standardize results at 12 such laboratories  
in the Far East, Siberia, Central Asia, the Caucasus, the Ukraine and the  
central European part of the Soviet Union. Control samples of soils  
containing the indicated pesticides were sent to the laboratories. While  
the test samples were accurate to  $\pm 2\%$ , laboratory errors using gas-liquid  
chromatography were about 15%. Methods for calculating results are  
summarized. The complexity of procedures required to determine levels of  
these pesticides in the soil samples contributed to the fact that errors in  
analysis reached as high as 30%, and were in a non-linear relationship to  
the level of pesticide pollution. Both personnel training and failure to  
maintain standards during analysis are blamed for the poor results. Figures  
4; references 7 (Russian).  
[167-12131]



UDC 66.067.1:615.395

FILTRATION OF PHYSIOLOGICALLY ACTIVE LIQUIDS THROUGH PHENYLONE MEMBRANES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 1, Jan 84 pp 62-68

SHATAYEVA, L.K., STROGANOVA, S.D., MEL'NIKOVA, S.K., POGODINA, T.Ye.,  
NACHINKIN, O.I. and SAMSONOV, G.V.

[Abstract] The relationship between the filtration rate and viscosity of solutions being filtered through phenylone (polyphenyleneisophthalamide) was studied along with the feasibility of regenerating phenylone filters after exposure to protein mixtures. Experimental results showed that phenylone membranes are porous filtration materials with extensive porosity. The flow rate through these membranes was strongly associated with the viscosity of liquid. During filtration of dispersions and of complex colloidal mixtures, the flow rate depends on the viscosity, on the morphology of the filter material as well as on the interaction of suspended particles with contact surface of the membrane. The flow retardation occurring during the process may be due to clogging up of the filter pores. The flow rate decreases if the suspensions contain proteins. Evidently proteins undergo partial coagulation in membrane pores thus stopping the flow. It was shown that membrane filters may be regenerated after exposure to protein solutions by boiling them with 1 N alkali solution for one hr. This treatment regenerates original flow rate along with chemical sterilization of the surface, which is very important in any work with biological materials. Figures 4; references 14: 12 Russian (2 by Western authors), 2 Western. [163-7813]

## CATALYSIS

UDC 542.97:546.262.3-31:546.11:547.21

### SOME FEATURES OF CATALYTIC ACTIVITY OF COBALT SYSTEMS IN HYDROCARBON SYNTHESIS FROM CO AND H<sub>2</sub>

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan 84 (manuscript received 2 Jun 83) pp 60-66

LAPIDUS, A.L., Institute of Organic Chemistry imeni N.D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Some results are presented of research recently conducted at the Laboratory of Catalytic Reactions of Oxides of Carbon, Institute of Organic Chemistry on Fischer-Tropsch synthesis in the presence of cobalt catalysts. Experiments conducted at 1:2 mole ratio of CO:H<sub>2</sub>, 1:2 cobalt:carrier ratio, 190°C, one atmosphere pressure, and 100 liters/hour throughput velocity showed that the nature of the carrier has a marked effect on CO chemisorption. In the formation of a carbon monoxide chemisorption site on a CO catalyst, either electron-acceptor oxide systems or other oxide systems which favor the formation of solid solutions takes place which in turn facilitates absorption of carbon monoxide on the catalyst. The method of preparation has an effect on the activity of the catalyst, i.e., carriers with 200 Å pore size are at least one order less active than those with 10-50 Å. Apparently, a carrier having a developed surface with a porous structure promotes the formation of cobalt crystals of a size optimal for hydrocarbon synthesis. Also, the carrier, by reacting with cobalt, forms chemisorption sites for carbon monoxide. The carrier also affects the composition of unsaturated primary compounds (oligomerization, isomerization, disproportionation). Figures 5; references 15: 14 Russian, 1 Western.  
[157-83440972]

ACTIVITY AND SELECTIVITY OF DEALUMINIZED ZEOLITE CATALYSTS, PART 2:  
ACTIVITIES OF DEALUMINIZED TYPE Y ZEOLITES AND MORDENITE IN CRACKING NORMAL  
HYDROCARBONS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 12,  
Dec 83 (manuscript received 10 Feb 83) pp 2672-2677

TSYBULEVSKIY, A.M., KLYACHKO, A.L., PLUZHNIKOVA, M.F., STEPANOVA, I.N.,  
BRUYEVA, T.R., KAPUSTIN, G.I. and RUKHADZE, A.D., Institute of Organic  
Chemistry imeni N.D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Studies were conducted on the factors that determine catalytic activities of dealuminized type Y zeolites and mordenite by measuring the cracking reaction rates of hydrocarbons with identical effective molecular diameters (n-pentane, n-hexane, n-decane, n-hexadecane). Determinations with Y zeolites in which  $\text{SiO}_2:\text{Al}_2\text{O}_3$  was equal to 4.8, 5.6, 7.1, 10.2 and 22.8 showed that maximum transformation was obtained with the 5.6 zeolite. Testing of mordenite with ratios of 12.6, 17.8-20.0, 28.0, 47.2-50.0, and 118-125.0 showed that maximum activity varied with chain length of the hydrocarbon: the lower molecular weight hydrocarbons required a greater degree of dealuminization for maximum activity (30-50 with n-pentane, 28.8 with n-hexane, 20 with n-decane, and 12-18 with n-hexadecane). Diffusion was not a factor in determining catalytic activity, either in primary fragmentation or secondary hydrogen redistribution, which was attributed to the decrease in the number of acid sites connected with the loss of aluminum. Figures 4; references 12: 6 Russian, 6 Western.  
[146-12172]

PALLADIUM ON POLY BENZO{[BIS (BENZIMIDAZOLO) PHENANTHROLINE] DIONE}  
AS CATALYST FOR HYDROGENATION OF UNSATURATED COMPOUNDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 12,  
Dec 83 (manuscript received 19 May 82) pp 2678-2682

BELYY, A.A., CHIGLADZE, L.G., RUSANOV, A.L., GURGENIDZE, G.T. and VOL'PIN, M.Ye., Institute of Heteroorganic Compounds imeni A.N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] An evaluation was made of the catalytic effectiveness of Pd-poly {benzo[bis(benzimidazolo)phenanthroline]dione} ( $\text{PBI-PdCl}_2$ ), containing  $4 \pm 0.25\%$  Pd, in the hydrogenation of a variety of unsaturated compounds (1-octene, cyclohexene, isoprene, nitrobenzene, phenylacetylene, cyclohexadiene, etc.).  $\text{PBI-PdCl}_2$  was found effective as a catalysts in such relations at  $20^\circ\text{C}$  under 0.1 Mpa  $\text{H}_2$ , showing the highest activity with dienes. The reactions were slower in the case of olefins with an internal double bond than with a terminal double bond.  $\text{PBI-PdCl}_2$  was also effective in catalyzing disproportionation of cyclohexadiene to benzene and cyclohexane and isomerization of olefins and allyl alcohols. Figures 3; references 10: 8 Russian, 2 Western.  
[146-12172]

## SURFACE COMPOSITION OF DEALUMINIZED MORDENITES AND CATALYTIC ACTIVITY IN XYLENE TRANSFORMATION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 12, Dec 83 (manuscript received 14 Jun 83) pp 2682-2688

MINACHEV, Kh.M., SHPIRO, Ye.S., MISHIN, I.V., MATKHE, T. and ANTOSHIN, G.V., Institute of Organic Chemistry imeni N.D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] X-ray photoelectron spectroscopy was employed in an analysis of the surface of dealuminized mordenite obtained by treating the Na-form with 0.25-4 N HCl. Removal of Al occurred primarily from the superficial layers leading to uneven distribution of Al in the mordenite sample: in the case of 20% Al loss the loss of Al from the surface amounted to 50%, while 50% dealumination resulted in the loss of 70% of the surface aluminum. As dealumination proceeds, the concentration gradient of Al among the superficial and deeper layers diminishes and at  $\text{SiO}_2/\text{Al}_2\text{O}_3=50$  there is little difference between the superficial and internal Al content. Determination of the catalytic activities of the various samples in xylene transformation indicated that transformation of alkyl aromatic compounds occurs largely in large crevices close to the surface of mordenite. Selectivity of low Al mordenites is reflected largely in the formation of asymmetric trimethylbenzenes as a result of o-xylene disproportionation. Figures 4; references 12: 8 Russian, 4 Western. [146-12172]

UDC 541.127:542.943.7:547.313.3

## KINETICS OF OXIDATIVE ACETOXYLATION OF PROPYLENE ON PALLADIUM-CUPPER ZEOLITE CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 12, Dec 83 (manuscript received 11 Jul 83) pp 2688-2692

MINACHEV, Kh.M., NEFEDOV, O.M., KHARLAMOV, V.V., PANOV, S.Yu., SHKITOV, A.M. and TROFIMOV, M.I., Institute of Organic Chemistry imeni N.D. Zelinskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Kinetic studies were conducted on Pd-Cu zeolite (1.5% Pd, 2.5% Cu) catalyzed oxidative acetoxylation of propylene, using 0.5 to 1.0 mm granule size zeolite to obtain 70-85% allyl acetate formation. The rate of oxidative acetoxylation was found to be independent of the partial pressure of  $\text{CH}_3\text{COOH}$ , but directly proportional to  $\text{O}_2$  pressure going through a declivity dependent on the partial pressure of propylene. Thermal reduction of the reoxidized catalysts showed that at 180°C only 20-25% of the total Pd is oxidized, indicating that only the Pd atoms on the surface of the catalyst are oxidized at that temperature. Since the rate of oxidation of Pd is less than the rate of allyl acetate formation,  $0.2 \times 10^{17}$  atoms Pd/g.sec and  $5 \times 10^{17}$  molecules/g.sec, respectively, it appears that it constitutes the rate-limiting step of the entire process. Figures 5; references 13: 3 Russian, 10 Western [146-12172]

STUDY OF CATALYTIC ACTIVITY OF NATURAL ZEOLITE FROM AYDAG DEPOSIT  
AZERBAIJAN SSR

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83  
pp 19-22

MUSAYEV, M.R., and MIRZOYEVA, K.G., Institute of Petrochemical Processes imeni  
Yu.G. Mamedaliyev, Azerbaijan SSR Academy of Sciences

[Abstract] To learn in detail the catalytic properties of Aydag zeolite, as well as the effects of catalyst crystallinity, alcohol feed rate, and reaction temperature in a continuous system, the authors studied the dehydrogenation of hexyl alcohol as a continuous process over a fixed-bed catalyst at 250°-450°C, and 0.5-5.0 liters/hour feed rate at atmospheric pressure. It was found that increasing the feed rate lowers the degree of conversion of alcohol and the degree of n-hexene-1 isomerization to equilibrium concentration. Skeletal isomerization of the primary product, hexene-1, also takes place. Figure 1; references 7: all Russian.  
[155-83440972]

UDC 541.128.13

PHYSICAL CHEMICAL AND CATALYTIC PROPERTIES OF Be-Mo AND Ga-Mo OXIDE  
SYSTEMS IN OXIDATION REACTIONS OF LOW MOLECULAR OLEFINS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83  
pp 30-33

RADEMAKHER, O., ALLAKHVERDOVA, N.Kh. and ADZHAMOV, K.Yu., Azerbaijan Institute  
of Oil and Chemistry imeni M. Azizbekov

[Abstract] Among the catalysts used for low molecular olefin oxidation, Be-Mo and Ga-Mo oxide systems are the least studied. These are known chiefly as solid solutions of Be and Ga in molybdenum trioxide. The authors therefore undertook a study of the physical chemical and catalytic properties of these systems and studied the effects of 1-15 atom% additions of Be and Ga of the physical chemical properties and catalytic activity of MoO<sub>3</sub> in oxidation reactions of propylene and butylene. X-ray and infra-red spectroscopic study of Be-Mo and Ga-Mo oxide systems confirmed the formation of Be and Ga ions in solid solutions of molybdenum trioxide. Introduction of Be and Ga ions to MoO<sub>3</sub> increases its activity in butene-1 isomerization reactions. Figures 2; references 6: 2 Russian, 4 Western.  
[155-83440972]

## EFFECTS OF ADDITIONS OF MOLYBDENUM TRIOXIDE ON CATALYTIC PROPERTIES OF ALUMINUM OXIDE IN BUTYLENE OXIDATION REACTIONS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83  
pp 34-37

AGAGUSEYNOVA, M.M., BABAYEV, G.I. and GAMID-ZADE, G.A., Azerbaijan Institute of Oil and Chemistry imeni M.A. Azizbekov

[Abstract] Binary aluminum-molybdenum oxide catalysts were synthesized by coprecipitation from aqueous solutions of ammonium heptamolybdate and aluminum nitrate, and the activity of these catalysts in butene-1 oxidation reactions was studied. Comparison of the catalytic activity of binary Al-Mo oxide catalysts with aluminum oxide showed that the addition of molybdenum trioxide has a positive effect in the mild oxidation of butene-1. The highest cumulative activity in butene-1 oxidation reactions was displayed by catalyst samples having 80:20 Al:Mo ration. A study of the acidity of the catalysts in butene-1 to butene-2 isomerization revealed a linear relationship between the rate of carbon monoxide gas formation and the acidity of the sample. Figures 3; references 6: 2 Russian, 4 Western.  
[155083440972]

## CATALYSTS FOR METHANE REDUCTION OF NITROGEN OXIDES

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 1, Jan-Feb 84  
(manuscript received 12 Jul 83) pp 18-20

MAL'CHEVSKIY, I.A., VLASENKO, V.M. and KUZNETSOV, V.A., Institute of Physical Chemistry, UkSSR Academy of Sciences

[Abstract] Catalytic reduction of nitrogen oxides with methane is used in purification of residual gasses generated in production of nitric acid. Palladium catalyst APK-2 is used as the catalyst for this purpose. To lower the consumption of expensive catalyst, a two stage process was developed: in the first stage APK-2 is used to bind most of the oxygen found in the residual gasses; in the second phase a cheaper catalyst is used to reduce nitrogen oxide. In an attempt to develop more effective catalysts for the second phase, a number of transition metal oxides was evaluated (Cu, Cr, Mn, Co, Ni). The most effective catalyst for the second stage of purification was chromium-copper oxide catalyst over  $Al_2O_3$  carrier (a modified APK carrier) which assured the same degree of gas purification as the catalysts deposited on gamma- $Al_2O_3$  carriers. Figures 2; references 12: 10 Russian, 2 Western.  
[166-7813]

## REGULATION OF POROUS STRUCTURE OF INDUSTRIAL ALUMINUM OXIDE BY HYDROTHERMAL METHOD

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 84 pp 36-37

ZELENTSOV, V.I. and CHERTOV, V.M.

[Abstract] Active aluminum oxide is widely used in various adsorption and catalytic processes, hence preparation and regulation of its porous structure represents an interesting methodological problem. Experimental results were reported of the study of hydrothermal modification of industrial aluminum oxide  $A_1$  and  $A_2$  yielding active  $Al_2O_3$  with different absorption-structural properties. This method yields active  $Al_2O_3$  with specific surface from 85 to 235  $m^2/g$ , total porous volume from 0.37 to 0.75  $cm^3/g$  and pore radii from 70 to 175 Å. Figures 2; references 5: 4 Russian, 1 Western.

[165-7813]

## PASSIVATION AND REDUCTION OF NICKELZEOLITE CATALYSTS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 2, Feb 84  
(manuscript received 18 Jan 83) pp 179-182

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[Abstract] Passivation and subsequent reduction under mild conditions is one of the methods used to preserve the initial surface areas of metallic catalysts on carriers. In the present work a study was made of how the conditions, under which nickel-zeolite catalysts are passivated and reduced, affect the surface area of the metal. Nickel-zeolite (NaX) catalyst of 0.63-1.0 mm particle size as produced at an experimental plant of the Groznyi Scientific-Research Institute were used. Nickel content was determined complexometrically, and surface area chromatographically by the quantity of oxygen chemisorption. Experiments showed that passivation with oxygen in a stream of helium without subsequent hydration increased the surface area, although it still remained less than the surface of the nickel after decomposition of carbonyl. Hydration after treatment with oxygen in helium or passivation with water followed by air treatment decreases the surface area of the metal. After one month's storage, the catalyst samples turned pale green, apparently due to the formation of nickel-aqua complex  $[Ni(OH)_2]^{2+}$ , which has a bright green color. Figures 2; references 9: 8 Russian, one Western.

[177-83440972]

## HYDRATION OF ACRYLONITRILE ON COPPER-CHROMIUM CATALYSTS

Ivanovo KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 27, No 1, Jan 84  
(manuscript received 23 Mar 82) pp 116-117

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[Abstract] Acrylamide has been produced recently in industrial quantities by hydration of acrylonitrile in the presence of copper or copper-chromium catalysts, permitting cost savings of ca. 25%. The present article reports on the effect of catalyst composition on catalyst activity, with copper:chromium ratios of 1.2:1, 9:1 and 17:1. After hydration with 5 g of acrylonitrile per gram of catalyst, chromatographic analysis showed that increased copper content brought increased activity, but the difference was not substantial enough to overweight catalyst durability considerations. Copper sulfate as a source of copper produced more active catalysts than did copper chloride, since some chloride ions consistently remained in the catalyst with the latter and retarded hydration. References 5: 3 Russian, 2 Western.

[168-12131]

UDC 541.18.047

## PREPARATION AND PROPERTIES OF POROUS CARRIERS FOR HIGH TEMPERATURE CATALYSTS

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian  
No 1, Jan-Feb 84 (manuscript received 5 May 83) pp 10-14

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[Abstract] The synthesis of porous carriers for high temperature catalysts has acquired special significance in the development of such processes as methane conversion to hydrogen and catalytic pyrolysis of petroleum products at 700°-900°C. In this case the carrier must have a stable porous structure, the particles must be resistant to thermal shock and be strong enough to withstand the conditions of usage. Carriers of this type are currently made by burning off organic matter such as petroleum coke or wood shavings added to an inorganic paste. This results in a carrier having a low specific surface. In the present work the authors modified this process by burning off the organic matter either under vacuum or in an inert gas at 1000°-1400°C followed by oxidative regeneration at 650°-700°C. This results in a well-developed porous structure. It was also found that changing the amount of burned off material while keeping its dispersion constant can change the porous structure of the carrier. Figures 2; references 6 (Russian).

[179-8344/0972]



VALENCY STATE OF PLATINUM AND CATALYTIC ACTIVITY OF Pt/CARRIER CATALYSTS

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 1, Jan-Feb 84 (manuscript received 22 Feb 82) pp 14-18

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[Abstract] One of the most widely used methods for preparing platinum catalysts is impregnation of a carrier with an aqueous solution of a platinum compound. In the present work a study was made of the effect of the valence state of the initial platinum compound on the catalytic activity of the catalyst. For this purpose three series of catalysts were prepared by impregnation of gamma-aluminum oxide, magnesium oxide and silicon dioxide with anionic and cationic platinum-ammonium complexes. It is shown that catalysts varying in catalytic properties can be obtained by changing both the carrier and the ionic state of the initial platinum compound. Figures 3; references 6: 3 Russian, 3 Western.  
[179-8344/0972]

## CHEMICAL INDUSTRY

### OVERVIEW OF HIGH-LEVEL CHEMISTRY

Moscow ZNANIYE-SILA in Russian No 2, Feb 84 pp inside cover - 2

[Interview with Deputy Chairman of USSR State Committee on Science and Technology Kirill Mikhaylovich Dyumayev by ZNANIYE-SILA correspondents M. Adzhiyev and M. Kuryacha; date and place not specified]

[Text] CORRESPONDENT: It has been said that the economy could not be effective without high-level chemistry. This would seem to mean simultaneous and proportionate development of the entire gamut of chemical industries and the science of chemistry. How is this job being handled today?

K. DYUMAYEV: Over the past twenty-five years the pace of development of the chemical industry has systematically outstripped the pace of development of industry taken as a whole. During this period there has been a more than eight-fold rise in the production volume of the chemical and petrochemical industry.

During the last two five-year plans alone we have begun to nearly triple the output of mineral fertilizers. In 1973, the Soviet Union took first place in this category in overall volume.

There has been a many-fold increase in production of synthetic resins and plastics, an appreciable increase in the output of chemical fibers and filaments and other major forms of goods. It is important to stress that in this regard there have been great changes in the structure of production toward an increase in the output of progressive kinds of goods. It should be added that there has been an expansion and qualitative change in the raw-material base of chemistry as well. Such are the initial tenets of the chemical industry today. The process of updating of the industry also goes on constantly: during the last five-year plan, nearly 350 new kinds of items and materials were developed, as well as about 200 progressive and original technological processes.

We might begin with work being done in the interests of agriculture. Among the most significant research projects, let us mention development of a process of getting concentrated and slowly dissolving fertilizers such as carbomide-formaldehyde (KFU) fertilizers. An experimental-industrial facility for KFU production has already been built, technology has been worked out for production on an experimental-industrial scale, and the industrial production of KFU is being finalized on the basis of data obtained on this facility.

A process has been developed for getting phosphoric acid and ammophos -- an irreplaceable product for "supplemental feeding" of the soil -- from lean ores of the Karatau and Chilisyay deposits, enabling comprehensive use of natural resources, and considerably enhancing the capacities of the raw-material base for the production of phosphorous-containing fertilizers...

It would be impossible to tell about all achievements of the sector, and I will give just a few more examples. Work has been completed on production of new grades of polymer materials and the technology of producing large-tonnage plastics and synthetic resins. This has enabled the production of such polymers as polysulfone, polyphenylene oxide, optical polycarbonate, and some other polymers with predetermined properties.

But, it seems to me that this does not merit lengthy discussion. We are speaking of new polymers with predetermined properties, i. e., adapted to the conditions under which items made from them are to operate. For example, in an especially aggressive medium or under conditions of elevated temperatures. In a word, wherever ordinary plastics cannot be used.

Production of thermoplastic pipes has been started, and the entire technological process is automated.

We could mention, for example, successful research by the Institute of Mechanics of Metallopolymer Systems, BSSR Academy of Sciences. The institute has developed and successfully tested a lubricant on a polymer base providing simultaneous anticorrosion protection of railroad switches, and protection from icing over. The use of this new lubricant guarantees reliable operation of railroad switches year-round.

Fundamentally new high-strength synthetic filaments and monofilaments have been approved for the first time in world practice. The solution of this problem has enabled the beginning of industrial production of hay-baling twine during the Eleventh Five-Year Plan, eliminating the use of metal banding for this purpose.

Chemists have something to demonstrate and talk about in the field of dye production. The industrial production of new liquid dyes has been mastered for fast coloring of synthetic thread of the "nitron" type. And black pigment based on commercial carbon, i. e., based on utilized production waste, is now being produced at the "Krasitel" Rubezhanskiy Production Association.

New emulsified cooling and lubricating liquids containing polymer-forming additives are being put into production at Perm Petroleum Oil Plant. These liquids are irreplaceable in cold machining of metals. They increase the cutting speed, prolong the service life of tools by covering tool and workpiece with a fine polymer film, and thereby appreciably reducing friction and machining temperature. (For more detail on this point, see ZNANIYE-SILA, No 1, 1982.)

A technological process has been developed and mastered for producing high-quality SKI-3 polyisoprene rubber, reducing the expenditures of natural rubber in the tire industry. This has saved tens of millions of rubles.

Considerable research has been done in the area of protecting metals from corrosion. Another attractive feature of the coatings that have been developed is that they are made from inexpensive and readily available components.

CORRESPONDENT: It is well known that our national economy has great reserves and capabilities. Obviously, these reserves must be sought in acceleration of scientific-technical progress, extensive and rapid introduction of advances in science, engineering and leading experience into production, of course with universal savings of raw materials. For this reason, it would be of interest if you would tell us how advances in chemical science are put into production.

K. DYUMAYEV: Gosplan SSSR, the USSR State Committee on Science and Technology, and the USSR Academy of Sciences have confirmed one hundred and seventy scientific and technical programs, forty of these being goal-directed programs. In the field of chemistry and chemical machine building, twenty-five scientific-technical programs have been confirmed, including seven goal-directed comprehensive scientific-technical programs. These have been introduced as a component part into the Eleventh Five-Year Plan.

The scientific-technical programs are tied in with plans of funding and maximum support with all resources through the entire chain from research to production organization. In other words, the programs have become a kind of national economic order to chemical science and industry. They have been called upon to produce a qualitatively new generation of technology and items with smaller inputs of labor and materials per unit of production.

And then, industrial mastery of the results of scientific-technical programs may reduce the influence of many factors that complicate conduct of the national economy. For example, preparing beforehand for a reduced increment in labor resources, for increased complication and expense of extracting minerals, for the rising expense of environmental protection and so on. In a word, the goal-directed programs provide for the whole cycle from scientific research to production and mastery of new equipment and technology. And besides, this does not cover all the basic steps that ensure introduction of new equipment and technology to the specific predetermined volumes. That is, as we can see, the plans cover complete advancement of the model in production, as it is said, "from the bolt to the machine", and at the same time the place of operation of this machine is determined beforehand.

As a rule, the program directors designate managers of ministries and agencies, as well as eminent scientists of our nation, ensuring due efficacy in realization of programs and rapid practical realization.

As I have already stated, the most important scientific-technical programs comprise a component part of the state national economic plan.

CORRESPONDENT: Which programs would you call the most important?

K. DYUMAYEV: For example, goal-directed comprehensive programs deal with production of synthetic liquid fuel, ultrastrong fibers, new catalysis, filled polymers and composites, chemical and biological agents for protection of plants and animals.

CORRESPONDENT: Could you go into this in a little more detail?

K. DYUMAYEV: Of course. According to the resolutions of the Twenty-Sixth CPSU Congress, our nation is engaged in improving the fuel-energy complex. In this connection, new problems have arisen in processing of coal, petroleum and gas. In particular, the coal of the Kansk-Achinsk deposit in Eastern Siberia.

Large-scale exploitation of this deposit is possible only by using fundamentally new principles of coal processing. In this connection, it has been deemed advisable to process the Kansk-Achinsk coal in situ, producing inexpensive electric power and synthetic liquid fuel [SLF]. About one hundred and fifty scientific agencies, design organizations and industrial enterprises of many ministries and agencies have been called upon to carry out the program of SLF production. Institutes of the USSR Academy of Sciences, the Siberian Department of the USSR Academy of Sciences and the academies of sciences of the Soviet republics are taking part in solution of the problem. (See ZNANIYE-SILA, No 10, 1982 for more detail on the SLF problem.)

Now in progress is construction of the ST-5 and ST-75 experimental-industrial facilities for a new hydrogenization technique of processing Kansk-Achinsk and other kinds of coal with capacity of 2000 and 20,000 metric tons of coal per year. In parallel with this, unique equipment is being developed for these facilities. The development of equipment for obtaining SLF and other chemical substances from coal is a completely new direction, and there is almost no experience in this area of machine building.

Scientists of some CEMA member nations have taken a part in solving the SLF problem. Another attractive feature of the equipment developed for SLF production is that it enables more complete use of the initial raw material -- coal. For example, the utilization of gas that is formed in the process of SLF production opens up the possibility for producing a number of other chemical substances from coal, including plastics. And the slag may become a raw material for production of building materials. In a word, coal can fully serve the national economy without losses.

Separate mention should be made of such a traditional product as methyl alcohol (methanol). Methanol may be acquiring a new role in connection with application on the one hand as an additive to engine fuels, and on the other hand as raw material for such fuels. In this regard, consideration should be taken of the feasibility of using it for coal transportation over long distances through pipelines.

There are two versions of such transportation: a water slurry can be made, i. e., a suspension of coal in water, but then, it is not just the coal that is transported to great distances, but the water as well. Or, a methanol slurry can be made, and the consumer can be provided with two kinds of fuel at the same time. Which of the two versions is economically more advantageous and technically feasible, must be demonstrated by research done by a number of scientific and production organizations. Methanol is also the initial product for making protein and a wide range of chemical agents. The necessity of a series of works dealing with methanol is becoming apparent.

CORRESPONDENT: The next of the programs that you mentioned was devoted to ultra-strong fibers.

K. DYUMAYEV: Synthetic threads are extensively used today in the national economy, and the demand for them is on the increase. In addition, along with the requirements for production volume there is also an increase in the requirements for the quality of goods produced -- industry demands primarily stronger synthetic fibers from chemists.

For this purpose, during the period from 1981 through 1985 the goal-directed comprehensive program calls for development and industrial introduction of synthetic monofilaments and pellicular filaments. In this way it is possible to improve filaments of traditional materials, producing them by a completely new technique. In other words, the output of chemists -- polypropylene and capron -- becomes two or three times stronger.

CORRESPONDENT: And what are these new filaments like, what can we compare them with?

K. DYUMAYEV: If several different filaments are plaited in a certain sequence, a so-called complex filament is obtained. Imagine webbing woven from narrow films. This is what is called a pellicular filament.

The use of high-strength synthetic filaments in different areas of the economy will give the nation a considerable savings, and besides, in future will almost totally displace natural fibers from the sphere of technology.

Institutes of the Ministry of the Chemical Industry, the USSR Academy of Sciences and the Ministry of Higher Education of the USSR in creative cooperation with chemical enterprises have developed the appropriate technology, and have created and put into production pellicular filaments for hay-baling twine. It is possible that in the immediate future the manufacture of viscose twine may be dropped completely, which in turn will enable redirection of valuable natural raw material to the production of viscose fiber for consumer goods.

Equally great benefits are promised by the use of monofilaments of polypropylene and polyamide, and also complex polyamide filaments. Nets made from reinforced filaments have been successfully tested in the ocean. As compared with traditional nets, those made from monofilament have low hydraulic drag, giving an appreciable savings in fuel, and more importantly, enabling an increase in trawling speed. The new nets have a longer service life in the fishing industry than the old ones made of ordinary natural and synthetic fibers.

CORRESPONDENT: Now what about new catalysts?

K. DYUMAYEV: In the modern chemical industry, there is a continuous expansion in the use of catalysts outside of the sphere of chemical production; for example to decontaminate industrial emissions and exhaust gases of internal combustion engines.

Catalysts are substances that accelerate chemical reactions. A great deal depends on their quality: the duration of continuous operation of facilities, the expenditure of raw material and energy resources, and much more.

Catalysts are indispensable in modern chemistry. It is for this reason that the intersectoral problem of catalysts has been included among State goal-directed comprehensive scientific-technical programs.

Already as a result of carrying out the program, new and effective catalysts have been developed and are being introduced. As a result of using these, for example in the production of polymers, there is considerable reduction and simplification of technology, enabling elimination of some costly equipment in chemical combines. Besides, there has been an expansion of possibilities in synthesis of chemical products with predetermined properties. A new generation of catalysts is opening up great prospects for the production of monomers of synthetic rubber and other necessary products. In the stage of development are catalysts for cleaning the exhaust gases of internal combustion engines that are necessary for city streets, and especially for mines and quarries, where air circulation is difficult. These products of chemistry improve environmental protection. The results of research being done at the Institute of Catalysis of the Siberian Department, USSR Academy of Sciences, the Scientific Research Institute of Physical Chemistry imeni L. Ya. Karpov and some other scientific institutions is encouraging.

CORRESPONDENT: And now, if you please, a few words about highly filled polymers.

K. DYUMAYEV: The necessity of replacing and saving scarce natural resources has acted as a stimulus for rapid development of the industry of synthetic polymers. Low weight, strength, resistance to aggressive media, comparative simplicity of processing into articles have made it possible in many cases to replace metal. Of course, this does not mean that polymer materials will displace metal totally in construction. Plastics, like metals, have their optimum fields of application.

Filled polymers are attracting more and more attention in recent years. Indeed, one of the goal-directed comprehensive programs is aimed at construction materials of this type. A new method of filling plastics with inert additives (sand, perlite, talc) yields polymer materials immediately in the process of polymerization. This is very advantageous, as it enables a savings of up to fifty percent of organic raw material, replacing it with inexpensive inorganic material. The finished filled polymers retain the properties required by engineering.

Highly filled (up to 80 percent) polymers are also being extensively used in different areas of the national economy. According to rough estimates, the use of highly filled polymers for making pipes of various purposes, sheets, film materials, packaging, machine-building items and in other sectors of the national economy will result in a considerable savings (on this point, see ZNANIYE-SILA, No 8, 1981).

The program provides for production of new composites and items that must work reliably under conditions of vibrations, materials that do not lose their physical properties with abrupt temperature differentials, under the action of high energies, and in various aggressive media. The field of application of the new materials is exceptionally broad: machine building, agriculture, transportation -- in a word, everywhere.

CORRESPONDENT: In your opinion, which of the programs can be called the most promising, the one of greatest urgency?

K. DYUMAYEV: The prospects of genetic engineering, of engineering enzymology would be difficult to overstate. The development of these programs, realization of the results achieved in new areas, will enable our nation to fulfill the Food Program more rapidly, and not only this.

CORRESPONDENT: But, if you will excuse me, Kirill Mikhaylovich, hasn't it always been assumed that this is the domain of biology rather than chemistry?

K. DYUMAYEV: The significance of each of the goal-directed programs for chemistry is extremely important, and it might be better not to attempt to compare them. Nonetheless, the time has come in our talk to mention biotechnology. Why do we call the new area biotechnology? Modern biologists, in working at the juncture of sciences, do not disrupt them. The processes that take place in a living cell are chemical processes. It is no error to say that biology is intimately entwined with chemistry.

For example, take biotechnology. This is a promising multiprofile branch of scientific-technical progress that includes genetic and cellular engineering, engineering enzymology, microbiological synthesis, and also the use of renewable biological sources for energy production, microbiological methods of environmental protection.

A goal-directed program on biotechnology has been developed and confirmed in the Soviet Union. The program sets the goal of the most rapid introduction of the already existing theoretical start into practice. The circle of fundamental research is very broad. It covers a variety of problems of proteins, nucleic acids and polysaccharides. Within the framework of the program, an investigation is also being made of the structure and functioning of hormones, prostaglandins, neuropeptides, and also natural biological membranes whose role is extremely important for life activity of cells and the chemical processes that take place therein.

A universal understanding of these physicochemical processes promises creation of new methods of treating the most widespread diseases of man, such as cardiovascular, oncological, neuropsychic disorders, combatting epidemics of viral illnesses. Goal-directed selection may be possible in animal and plant breeding, opening up the way to highly productive species of agricultural plants and animals.

The main task of fundamental research in physicochemical biology is to study the laws of life activity on the molecular level, an understanding of which is necessary for the development of work in applied spheres of biology, practical medicine, agriculture, microbiology, feed production, and the food industry.

In the field of genetic engineering attention is concentrated on production of some substances that carry artificially incorporated genes coding for biosynthesis of these substances. These rather costly natural compounds play a



regulatory and protective role in the organism of man and animals. Up until now these substances have been obtained from the tissues of animals or donor blood, and their isolation from natural materials so far involves considerable technical difficulties and appreciable expenditures. Primary among these are insulin, interferon and human somatotrophic hormone, immunological preparations and essential amino acids. They can be produced in future by industrial techniques.

Further study of plant cells will enable us in the complete sense of the word to build plants with new properties. Plants that ensure high yield, resistance to a variety of diseases and pests.

On this basis, the goal-directed program provides for developing new methods of propagating planting and selection material for potatoes, sugar beets and a variety of feed crops, more productive varieties of trees. All this will enable a reduction in expenditures for production of chemical pesticides and improvement of the state of the environment.

Cellular engineering opens up the most unexpected prospects, e. g., for industrial production of unique products of plant cells, among which are the biomass of ginseng, various groups of alkaloids, steroid saponins, glycosides and other compounds. These are materials of plant origin, but industrially produced; they will also be extensively used in the medical industry.

In the field of engineering enzymology, research will be aimed at creating fundamentally new biocatalysts that are capable of producing a stronger and more rapid effect on industrial processes than the traditional catalysts used today.

Solution of the problems outlined in the program will enable development of new technological processes at relatively low temperatures (30-60°C) that do not require great expenditures of energy, produce no byproducts and do not pollute the environment, and will considerably increase the production of active substances, proteins and medicines, as well as food products.

And this is only one specific example. It can be assumed that the use of genetic engineering methods in production of interferon will reduce the cost of this chemical by a factor of ten or even a hundred, while at the same time reducing the amount of inert additives by a factor of nearly a hundred.

CORRESPONDENT: Evidently the solutions of these problems will require intensive development of all sciences that lie at the foundation of physicochemical biology: biochemistry, bio-organic chemistry, molecular biology, microbiology and genetics. Thus, the "saturation" of comprehensive programs with component elements is increasing, i. e., there is an increase in the number of those taking part in realization of the program. In this connection, our last question is how track is being kept of performance of the goal-directed programs?

K. DYUMAYEV: The USSR State Committee on Science and Technology has passed a resolution on setting up an automated system for keeping track of the progress of scientific-technical programs. Directly on location, this will be the job of republic and territorial centers of scientific-technical information that

must regularly report to our committee, party and business agencies about the status of the work, and take timely measures to redirect it.

The comprehensive goal-directed programs are a major component in control of scientific-technical progress of the nation. They ensure businesslike and prolific ties between workers of science and production. And this is their main strength.

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## HIGH QUALITY ANILINE SPOILED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Feb 84 p 1

[Article (from Volgograd) by G. Larinov, Chief of Division of Chemical, Petroleum and Gas Industries, Obkom CPSU: "Confusion With Five Nines"]

[Text] In the city of Volzhskiy on the last day of 1982 an act was signed by the state commission for receiving aniline production for consumption. Although not essentially new for our country, this production is unique from the standpoint of the quality of the product. As a result of using double distillation, the Volzhskiy chemical workers for the first time started producing 99.999 percent aniline on an industrial scale! The demand for a chemical product this pure is enormous. Using it makes it possible to significantly increase the quality of domestic dyestuffs, synthetic resins and other products.

The new production may be said to have fallen into good hands. The Production Association "Orgsintez" is one of the outstanding in the Ministry of Chemical Industry and in Volgograd Oblast. Hence, it is not surprising that the norms expended for mastering the new installation were reduced by one half.

Union specialists introduced many improvements to the initial design in order to achieve waste-free and economical production processes. Thus, for each ton of end product approximately 500 kilograms of waste products are formed, consisting mainly of various resins which were intended to be burned off. The chemical workers did not agree with such a decision. After studying the composition of the resins, the engineers discovered that they could easily be used to obtain surfactants which could be used to stimulate oil flow in a formation by injection through oil wells. Now, it may be said that yesterday's wastes are being snatched up.

Here, they also found an application for carbon dioxide. It is directed to other installations for the synthesis of morpholine. This product, produced nowhere else in the country, is essential for preparing rubber additives, primarily in the production of large sized tires for open-pit mine dump trucks, to increase their longevity by 20 percent.

In a word, much has been done for the new production to meet the highest requirements. However, all of these efforts were to no avail through no fault of the personnel.

Immediately after the first production the installation remained idle for an entire quarter: lack of basic material - nitrobenzene. The Perm Chemical Plant imeni S. Ordzhonikidze was not prepared to collaborate with the Volzhskiy personnel. And so far, the Ural partners are still not punctual. During this past year, they have failed to deliver over 3,500 tons of nitrobenzene. Right now, the new installation is being charged to only one third of its capacity owing to raw material shortages.

But this is only one side of the problem. What hurts even more, is the fact that the ultrapure aniline, almost entirely intended for remote customers (it is sent to Tambov, Rubezhnoye, Kemerovo and other cities), has nothing in which to deliver it in. If it is poured into ordinary railroad tank cars, almost immediately organic resins start to separate out, and the product darkens. It then arrives to the customer in a very poor quality.

Who allowed this error to take place? In our opinion, the basic responsibility lies with the author of the project - the Moscow institute "Giproorkhim". From the very beginning this organization was obligated to oversee the delivery of the ultrapure aniline in special tank cars line with stainless steel or enamel. However, this was not done, ostensibly for the purpose of "economizing" on the design. But now the originators of the complaint refuse to accept responsibility, claiming that they are only responsible for working out the process to delivery of the finished product to a warehouse.

The question now remains what should be done so that "five nines" would not be empty amusement. The Ministry of Chemical Industry has yet to make its weighty utterance. But it still continues the role of a sideline observer.

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CSO: 1841/162

## CAUSTIC SODA PLANT STARTS UP IN KALUSH

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Feb 84 p 4

[Article from TASS, Ivano-Frankovsk Oblast, in the column "Labor Rhythm of the Fourth Year of the Five-Year Plan": "A Chemical Giant is Growing"]

[Text] The Khlurvinyl Association collective in Kalush will considerably increase the supply of caustic soda to chemical industry enterprises. Yesterday the first line of the production complex here was put into operation; an annual output of 125,000 tons of raw material is projected for use in obtaining chemical fibers, detergents and other materials.

The complex is provided with the most modern equipment supplied from all brother republics.

The Khlurvinyl Association, which already has more than 40 kinds of production, will continue to grow. Large-scale production was begun here with production of ethylene.

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CSO: 1841/148

## RESEARCH IN ORGANIC CHEMISTRY ORIENTED TOWARD INDUSTRIAL APPLICATION

Moscow SCIENCE AND LIFE, Television Program in Russian 21 Feb 84

[Editorial Report] Moscow Television Service, in Russian, 0800 GMT 21 February carries its weekly 30-minute "Science and Life" program which is devoted to the work of the N.D. Zelinskiy Institute of Organic Chemistry. After showing the wide application of organic chemistry in industry with a montage of shots of plants producing medicines, chemical fertilizers, and other compounds, the program introduces Academician Nikolay Konstantinovich Kochetkov, the institute's director, who talks about the impact of organic chemistry on the development of science and industry.

The program continues with a review of past outstanding organic chemists who headed the institute, with video showing their portraits, as the narrator briefly outlines their contributions to science. After shots of various equipment and instruments being used in a laboratory, the program introduces V.B. Kazanskiy, corresponding member of the Academy of Sciences, who discusses pioneering work in catalytic agents done by Zelinskiy and work being done in this field today, particularly with zeolite catalyzers in producing fuel from pit coal. He mentions in this regard the work of Academician Minachev, who showed that these catalyzers are capable of hydrating organic compounds and are not sensitive to catalyst poisons. He adds that it was recently shown that benzol could be produced from ethane with their help.

Following further video shots of laboratory equipment, Kochetkov is shown again pointing out that organic synthesis and organic catalysis are the major fields of research of his institute, V.M. Zhulin, doctor of chemical sciences, then discusses research on the effects of high pressure on chemical reactions. He mentions work conducted in conjunction with the Vitaminy Scientific Production Association in producing vitamin A and beta-carotene. Equipment is shown as the narrator reports that pressure of 27,000 atmospheres at temperatures up to 300 degrees were achieved.

New methods of organic synthesis based on the reactions of free radicals are then discussed by G.I. Nikishin, doctor of chemical sciences, who describes how these free radicals simplify the production of complex molecules and he speaks in general terms about the difficulty of controlling such reactions and research aimed at their broader application.

The narrator outlines the economic benefit of introducing the institute's findings in the economy noting that in the past 5-year plan period it was valued at R50 million. Video shows more laboratory equipment as Kochetkov continues discussing results of the institute's work. The topic then turns to environmental pollution, particularly that resulting from the use of chemical pesticides. The development of biological means of combating agricultural pests is discussed as video shows experiments using compounds which can be used to destroy insects without using chemical pesticides. O.M. Nefedov, corresponding member of the Academy of Sciences, describes the work of his laboratory on production of unstable molecules and biologically-active substances for pest control and explains their high toxicity to pests and relative safety to the environment and to humans. He adds that one of the substances has already been tested on cotton crops and hothouse vegetable farms.

The program goes on to discuss the problem of industrial pollution as video shows smoking plant-chimneys and the narrator notes that the institute has developed methods for purifying various gases which are already being used in industry. A.M. Rubinshteyn, doctor of chemical sciences, then talks about the research work being done on producing the necessary heterogeneous catalysts for gas purification. He mentions in particular the development of a chromium silicate catalyzer for removing hydrocarbons from gases.

After discussing the introduction of scientific and technical achievements into industrial production, Kochetkov and S.Z. Tayts, doctor of chemical sciences, note where the institute's findings have been used, particularly at the Belgorod vitamin combine where vitamin A is produced. The question of incentives for industrial enterprises to proceed with this introduction of innovative technology is also discussed, and Kochetkov stresses that industry rather than scientific institutions need the incentives, because introduction of discoveries is incentive enough for scientists. In conclusion, Kochetkov names a number of institutes which are outgrowths of the Institute of Organic Chemistry, noting that they indicate a positive trend reflecting the growth of Soviet science.

## TRAPPING OF AMMONIA FROM INDUSTRIAL GASSES

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 84 pp 29-31

KHARLAMPOVICH, G.D., ZAKAMENNYKH, T.M. and KUDRYASHOVA, R.I.

[Abstract] Several methods used for removal of ammonia from industrial gasses have been reviewed and evaluated: absorption with sulfuric or phosphoric acid, extraction with water and cyclic phosphate method. The last method appeared to be the most effective one yielding anhydrous ammonia as the end product. Using monosodium phosphate (MSP) solution as the absorbing agent increased the capacity of ammonia to 80 g/dm<sup>3</sup> under conditions of saturating the absorber to the point of forming sodium-ammonium phosphate (SAP) pulp. Separation of solid pulp from mother liquor and its regeneration made it possible to obtain pure ammonia water without additional purification with alkali. The acid impurities are concentrated in mother liquor. Figures 5; references 14: 9 Russian, 5 Western.  
[165-7813]

## EQUIPMENT FOR UTILIZATION OF HEAT OF DISTILLATION LIQUID FROM PRODUCTION OF SODIUM CARBONATE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 84 pp 42-44

GORSHKOV, G., POPOV, A.V., PSAKHIS, B.I. and SHAKHOVA, A.F.

[Abstract] Distillation of filtering liquids obtained in production of calcined sodium carbonate results in large quantities of highly mineralized, hot (90-100°C) suspension which is difficult to cool and creates a disposal problem. A multiple stage unit was developed which utilizes heat from the distillation liquid for heating chemically-purified water, which decreases the volume of hot liquids that need to be dumped into reservoirs and which makes it possible to recover dissolved ammonia, 40-50% of which can be captured. Most of the ammonia is absorbed in the condensed residue used in production of calcined sodium carbonate. To extend the performance of this plant, heat exchange surfaces should be made either from titanium or from carbon steel with protective anticorrosion cover. Measures aimed at lowering incrustation of pipelines and working surfaces need further elaboration. Figures 3; references 6 (Russian).  
[165-7813]



## HYDROGEN SOURCES FOR LABORATORY UTILIZATION

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 1, Jan-Feb 84  
(manuscript received 7 Feb 83) pp 45-47

LUK'YANCHIKOV, V.S., Gas Institute, UkSSR Academy of Sciences

[Abstract] The disadvantages of using tank containers of compressed hydrogen for laboratory utilization have been pointed out, centering primarily on safety measures. Three methods of producing "in situ" hydrogen at the experimental site were discussed: hydride accumulators and electrodiffusion generators of hydrogen as well as diaphragm electrolyzers of water. Figures 2; references 3: 2 Russian, 1 Western.  
[166-7813]

## CONTRIBUTION OF URALKHIMMASH PRODUCTION ASSOCIATION IN IMPLEMENTING FOOD PROGRAM

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 1, Jan 84  
pp 1-2

MAKAROV, V.M., doctor of technical sciences, general director, Uralkhimmash Production Association

[Abstract] The Production Association devotes a major portion of its attention to supplying high-production agricultural equipment to produce mineral fertilizers, protein-vitamin concentrates and feed yeasts. Among its innovations are high-pressure liquid ammonia plants producing 200,000 to 450,000 tons per year. The present article discusses modernization of such plants to reduce size and improve efficiency of operation. Hydrolyzing equipment for microbiological production is also produced by the Association. The exacting standards required of such equipment have led to use of AT-3 titanium alloy to assure continuous operation. Spare parts are being provided to assure minimum time for repairs and overhauling. Improved harrows and silage collectors also come from the Association, and a further direction of its labors is in providing for the needs of labor crews. Photographs 3.  
[150-12131]

## CELLULAR HEAT EXCHANGER FOR LOW PRESSURE CRYOGENIC SYSTEM

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 1, Jan 84  
pp 3-4

ZHURAVLEVA, I.N., ONOSOVSKIY, Ye.V. and USANOV, V.V., candidates of technical sciences, KLIMENKOV, D.A. and KORNEYEV, V.A., engineers

[Abstract] Exhaust-free low-pressure cellular heat exchangers offer great promise for cryogenic applications. The present article describes such exchangers made of copper and coating cement filled with boric nitride. The exchanger contains 7 feed channels and 2 return channels of 5 or 10 mm, narrowed by the cement to 4-4.5 or 9 mm, respectively. Study of heat and hydraulic aspects showed, among other things, that consumption imbalance related to actual manufacture would be  $\pm 2\%$ . Measurements of nitrogen consumption and temperature differences during operations are presented in graphic form. The heat exchanger was judged to be successful, with further efficiency of operation possible by reducing the design's longitudinal heat transfer. Figures 3; references 9: 5 Russian, 4 Western.  
[150-12131]

UDC 697.94

## RATIONALITY OF AIR CONDITIONING UNDER VARIOUS CLIMATIC CONDITIONS

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNKA in Russian No 2, Feb 84 pp 14-15

GUBERNSKIY, Yu.D., doctor of medical sciences, ISMAYLOVA, D.I., candidate of medical sciences, Institute of General and Communal Hygiene imeni A.N. Sysin, USSR Academy of Medical Sciences, and VASILKOV, P.S., engineer, Gosgrazhdanstroy

[Abstract] To evaluate the effectiveness of air conditioning, experimental studies were conducted in various design and research institutes of Tashkent. Data were obtained which show that labor productivity rose 11.2% when the air in a building was lowered from 36° to 25°C. The same data also showed that the increased labor productivity was more the result of shorter rest periods than higher labor performance. During the hottest time of the year when the outside temperature was 37°-42°C, air conditioning improved labor productivity by 46%. The authors conclude that installation of air conditioning systems is justified only under extreme temperature conditions, and that widespread use of air conditioning in regions of moderate climate, unless called for by other reasons, is not expedient. References 6: 3 Russian, 3 Western.  
[176-83440972]

## ESTABLISHING MAXIMUM PERMISSIBLE EMISSIONS FROM LOW LYING INDUSTRIAL SOURCES

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 2, Feb 84, pp 16-18

NIKITIN, V.S., doctor of technical sciences and PLOTNIKOVA, L.V., MAKSIMKINA, N.G. and SAMSONOV, V.T., candidate of technical sciences, All-Union Central Scientific Research Institute of Work Safety of the All-Union Central Council of Trade Unions

[Abstract] One of the criteria for evaluating the effectiveness of measures taken to prevent air pollution in a region is the magnitude of the maximum permissible emission (MPC) while still observing the maximum permissible concentration (MPC) of contaminants in the ground layer of air. The MPC values for a single low-lying industrial source should be computed according to the formulas presented by the State Commission on Hydrometeorology while also taking into account other high level sources of contamination and the future development of the region. When there is a group of low lying sources, emitting the same pollutants, an MPC value must be established that is based on the total emission as determined by other formulas. Figure 1; references 10 (Russian).

[176-83440972]

## AIR DISTRIBUTION WITH CONCENTRATED VENTING OF AIR FROM ROOM

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 2, Feb 84 pp 19-20

NEYMARK, L.I., candidate of technical sciences, Central Scientific Research Institute of Industrial Buildings, and POZIN, G.M., candidate of technical sciences, All-Union Scientific Research Institute of Work Safety, Leningrad

[Abstract] Special heat exchange equipment is required in modern building construction to recover some of the otherwise lost heat in air before it is vented to the outside. To do this efficiently, the exhaust air should be concentrated in the same stage as the incoming air stream. A mathematical formula is presented from which it is possible to compute the intake and exhaust factors that are compatible with the required air movement in a work room. This formula may be used in a computer with the aid of an algorithm which provides for a minimum of places for centralized venting of air and efficient air intake. Figure 1; references 5 (Russian).

[176-83440972]

## COAL GASIFICATION

### GLUE-FASTENED BRIDGE

Moscow MOSCOW NEWS in English No 10, 18-25 Mar 84 p 10

[Text] A glue made from shale distillation products was used to fasten together parts of a new bridge built in one of the central districts of Tallinn, the capital of Soviet Estonia (a republic in the Baltic area).

Combustible shales are Estonia's main natural wealth. They are used not only as a cheap means of fuel for large thermal electric power stations in Estonia. More than 50 valuable chemical substances, including this glue, are manufactured from shales. The glue is already used in housing construction, in producing car tires and active chemical substances. Licenses to manufacture the glue have been bought by Japanese and Finnish firms.

CSO: 1852/9

## CHANGE IN STRUCTURAL PARAMETERS OF COKE COAL UNDER INFLUENCE OF $\gamma$ -IRRADIATION

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 1, Jan-Feb 84  
(manuscript received 26 Apr 82) pp 18-22

KRICHKO, L.B., KHRENKOVA, T.M. and KIRDA, V.S., Institute of Mineral Fuels

[Abstract] The effect of  $\gamma$ -irradiation on coke coal from Kuznetsk deposits was investigated by IR spectroscopy. Depending on the exposure dose, changes were observed in the content of carbon and oxygen: the former increased and the latter decreased as the dose was raised to 0.25 mrad. Irradiation appears to affect the content of simple ethers, the carbon-hydrogen bonds and the degree of aromatization. Doses exceeding 0.5 mrad led to a different effect: the content of aliphatic  $\text{CH}_2$  groups decreased, while the  $\text{CH}_3$ - and  $\text{CH}_{\text{Ar}}$  groups increased. The degree of aromatization increased due to the process of structuralization and polycondensation. Thus two types of structural changes were shown to occur during  $\gamma$ -irradiation. Preliminary dispersion of coal prevented some of the structuralization processes. Figure 1; references 14: 7 Russian (1 by Western author), 7 Western.  
[164-7813]

## EXTRACTION OF KANSKO-ACHINSK DEPOSIT COALS WITH ORGANIC SOLVENTS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 1, Jan-Feb 84  
(manuscript received 23 Aug 82) pp 63-68

YEKATERININA, L.N., VISHNYAKOVA, L.V., KHRENKOVA, T.M., ANDREYEVA, A.I. and ZHAROVA, M.N., Institute of Mineral Fuels

[Abstract] High solubilizing ability of dimethylformamide (DMFA) and ethylene-diamine (EDA) towards coal components is the result of chemical properties of organic materials contained in it. However, extraction of brown coal with DMFA goes poorly. Extraction with EDA is so effective that coal with different properties yield basically identical end products. Therefore, various solvent mixtures were tried in an attempt to find the best selectively-extracting combination. The optimal solvent combination consisted of 70% EDA and 30% DMFA. This composition gave adequate extraction power with selective fractionation of organic materials being extracted. In comparison to residue, the extracts contained higher levels of aliphatic and alicyclic structures, functional oxygen groups with hydrogen bonding, but lower levels of substituted aromatic compounds. It was noted that in a series of coals from different deposits (Irsha-Borodinsk, Abansk and Itatsk) the yield of extracts obtained correlated closely with the yield of liquid products obtained from hydrogenation of these coals. The residues showed similarly-decreasing order of the content of  $\text{CH}_2$ - and  $\text{CH}_3$ - groups as well as substituted aromatic structures. Figures 3; references 6: 3 Russian (1 by Western author) 3 Western.  
[164-7813]

## COMBUSTION

UDC 614.841.12

### MECHANISM OF INFLUENCE OF $\text{HC}^1$ AND $\text{HBr}$ ON CHEMICAL PROCESSES DURING COMBUSTION OF CARBON MONOXIDE

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 1, Jan 84  
(manuscript received 16 Dec 82) pp 99-103

SHEBEKO, Yu.N., KOROL'CHENKO, A.Ya. and BARATOV, A.N.

[Abstract] An analysis was made of the kinetics of oxidation of CO to  $\text{CO}_2$  in the presence of  $\text{HC}^1$  and  $\text{HBr}$  at the temperature range  $900^\circ - 1200^\circ \text{K}$  and 100 kPa pressure. Although the rates of heat loss and heat transfer are not completely independent of one another, in this work it was assumed that, in the presence of an inhibitor, only the heat transfer rate varies. Combustion of organic matter in air takes place in two stages. In the first, the fuel substance is oxidized to CO and  $\text{H}_2\text{O}$ , and an inhibitor containing  $\text{C}^1$  and Br is chiefly converted to  $\text{HC}^1$  and  $\text{HBr}$ . In the second stage, taking place inside the reaction zone, CO is oxidized to  $\text{CO}_2$ , with  $\text{HC}^1$  and  $\text{HBr}$  inhibiting the process. Figures 1; references 21: 12 Russian, 9 Western.  
[149-83440972]

UDC 536.46+662.311

### PARAMETERS OF COMBUSTION WAVES DISTRIBUTED BETWEEN BOUNDARY OF TWO FUELS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 1, Jan 84  
(manuscript received 24 Feb 83) pp 104-109

LEYPUNSKIY, O.I., MARSHAKOV, V.N. and ANAN'YEV, A.V., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Results are presented of a study made of the rate of combustion and temperatures during passage of a combustion wave between the contact boundary of two nitroglycerine model fuels. The two fuels had identical components but differed in content so that the combustion rate of one was about twice that of the other. It is shown that in the transition of a combustion wave from a fuel of "low" combustion rate to one of "high" combustion rate, there are three stages of the process: damping (or nonignition) of the fuel, direct transfer of combustion, and an intermediate stage of delayed ignition. Apparently, the damping and delayed ignition stages may be related to the focal point nature of the combustion wave distribution through the contact boundary between the two fuels. Figures 2; references 15: 14 Russian, 1 Western.  
[149-83440972]

PHOTOTHERMAL IGNITION IN SYSTEM  $\text{ClF}-\text{Cl}_2-\text{H}_2$ 

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 1, Jan 84  
(manuscript received 19 Jan 83) pp 110-117

SUYETINOV, A.P., KHARITONOV, A.P., MOSKVIN, Yu.L. and TAL'ROZE, V.L.,  
Chernogolovka Department, Institute of Chemical Physics, USSR Academy of  
Sciences

[Abstract] A study was made of the limiting phenomena during impulse photoinitiation of the mixture  $\text{ClF}-\text{Cl}_2-\text{H}_2$  for the purpose of clarifying the kinetics of development and the demise of interdependent chains with atomically active sites for  $\text{Cl}^1$ , F, and H. From the kinetic standpoint, a three-part system was proposed wherein the speed of the chemical reaction was determined by the content of either the low-activity  $\text{Cl}$  atoms, or the fluorine atoms. The theory of photothermal explosion is generalized for the case of a chain reaction initiated by three atoms, and the case having several limiting acts with closely similar activation energies is considered. Approximate analytical solutions of equations for thermal and material balance agree well with experimental results. Figures 4; references 8: 5 Russian, 3 Western.

[149-83440972]

UDC 661.715.342  
621.646.95

## RETARDING DETONATION OF ACETYLENE AND ACETYLENE-OXYGEN MIXTURES DURING PASSAGE THROUGH NARROW OPENINGS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 1, Jan 84  
pp 10-11

POTAPOV, A. Yu., engineer

[Abstract] A key operating condition for high-speed shutoff devices used to contain gas explosions is the closing action function ahead of flame movement. Some solutions have required much material and been awkward in appearance. The present article reports on a device for cutting off acetylene-oxygen mixture flames. The device is diagrammed and described. Tests have shown that as a stoichiometric  $\text{C}_2\text{H}_2+2.5\text{O}_2$  mixture is approached, detonation retardation decreases to 15mcs. The author studied the impact of the geometric form of the opening on detonation retardation with 5%  $\text{C}_2\text{H}_2+95\%$   $\text{O}_2$  at initial pressure of 0.1 MPa. Slits, squares and circular holes of equal 20 mm<sup>2</sup> area were tested. Forms of the detonation wave are used to explain the reduced retardation effect as initial pressure is increased. The tests established a 2mm diameter round hole as the best choice for a shutoff valve with acetylene or acetylene-oxygen mixtures. Figures 3; references 5 (Russian).

[150-12131]

RELATIONSHIP OF FLASH POINT AND FLAMMABILITY TEMPERATURES ON COMPOSITION OF  
AQUEOUS SOLUTIONS OF AMIDE SOLVENTS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 84  
(manuscript received 5 Jul 83) pp 22-23

MURAVYEVA, V.A. and KUDRYAVTSEVA, L.I.

[Abstract] Aqueous solutions of dimethylformamide and dimethylacetamide are used in the production of chemical fibers in settling and plasticizing baths. Current literature has flammability data on these solvents in pure form only, although aqueous solutions are also hazardous. A flash point study of these solvents over a concentration range of 50% to 100% (by weight) at 5% intervals shows that solutions containing less than 55% dimethylformamide or less than 70% dimethylacetamide are difficult to ignite. References 6: all Russian. [178-83440972]



UDC 621.357.2

CATHODE AND ANODE PROCESSES IN ELECTRODEPOSITION OF SHINY TIN-LEAD ALLOYS  
WITH NOVEL SHINE-FORMING ADDITIVE N-3

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 1, Jan 84  
(manuscript received 1 Mar 82) pp 171-174

TYUTINA, K.M., KOSMODAMIANSKAYA, L.V., SHEPELEVA, Ye.V. and KOLUPAYEVA, Ye.V.

[Abstract] A boron-fluorine-hydrogen electrolyte was developed for deposition of a shiny tin-lead alloy; with this electrolyte it was possible to perform the plating operations without stirring and at room temperature, using 8-12 A/dm<sup>2</sup> cathode current. During electrochemical workup of the electrolyte the electro-deposition process was not slowed down, indeed the yield in respect to current increased. There was practically no change observed in stored electrolyte. The lead content in the alloy changed insignificantly with increased cathode current density. These shiny lead-tin alloys could be deposited only in presence of shine-forming additives: N-3, OS-20 and formalin. Individually, all of them inhibit the alloy deposition process; N-3 by itself totally blocks the process. The electrolyte is chemically stable for 8 months. From time to time it should be renewed by addition of shine-forming additives, depending on the quality of the end product desired. Figures 3.  
[163-7813]

UDC 541.138.2:621.3.035.224

EFFECT OF LOW TEMPERATURES ON ANODE SOLUTION OF PLATINUM-TITANIUM ANODES IN  
SEA WATER

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 1, Jan 84  
(manuscript received 25 Feb 82) pp 174-177

KOVARSKIY, N.Ya. and ARZHANOVA, T.A., Institute of Chemistry, Far Eastern  
Science Center, USSR Academy of Sciences

[Abstract] Temperature decrease of dilute chloride solutions, including sea water, favors increased stability of platinum and platinum-titanium anodes (PTA). A change from 60° to 10° results in a 1.5 fold lower solution of platinum. Experimental data were reported in the present paper showing that at temperatures near the freezing point of sea water the solution rate of PTA increased substantially. The breakdown of the active layer occurred principally

as a result of the etching of titanium base at open pore sites with gradual crumbling of platinum particles as well as due to accelerated solution of platinum itself at sites of its contact with titanium and electrolyte. At higher temperatures, at which PTA breakdown through the pores does not occur, the stability of electrodes is directly proportional to the thickness of the platinum layer. Figures 2; reference 1 (Russian).  
[163-7813]

UDC 538.22

#### MAGNETIC PROPERTIES OF ORGANIC RADICALS AND ROUTES TO ORGANIC FERROMAGNETICS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 1, Jan 84  
(manuscript received 12 Apr 83) pp 3-11

BUCHACHENKO, A.L., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] The creation of organic ferromagnetics is a two-fold problem; the preparation of ferromagnetic polyradicals, and the creation of macroscopic ferromagnetism of organic radicals in crystals. While the first aspect of this problem is being successfully pursued in the literature, the second is more complex and remains unresolved. The present discussion on the magnetic properties of organic radicals touches upon the Curie-Weiss Law, magnetic permeability of radicals, and the structure of 38 organic radicals that have been studied. Basic experimental data on the magnetic properties of organic radicals are presented. Intermolecular exchange between radicals and possible routes to organic ferromagnetics are discussed. The author cautions that in the experimental detection of signs of ferromagnetism in organic radicals the danger exists of the effects of uncontrolled admixtures possessing ferromagnetism. Even insignificant quantities of admixtures can be substantial when dealing with weak ferromagnetism of radicals. Figures 5; references 28: 10 Russian, 18 Western.  
[149-83440972]

UDC 541.135.8-183:547

#### EFFECT OF pH ON ADSORPTIVE AND INHIBITIVE PROPERTIES OF SIX-MEMBERED HETEROCYCLIC NITROGEN COMPOUNDS (QUINOLINE)

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 2, Feb 84  
(manuscript received 19 Apr 83) pp 211-213

LOSHKAREV, M.A. and RYSAKOVA, L.V., Dnepropetrovsk Chemical-Technologic Institute

[Abstract] The capability of heterocyclic nitrogen compounds, such as quinoline, to protonize results in the electrochemical, adsorption and inhibitor properties of these compounds to depend on the pH of the medium.

A study was made of how a gradual changing of pH affects adsorption of the heterocycle and neutralization of metal ions. Differential capacity curves of  $10^{-3}\text{M}$  quinoline in the pH range of 0.8 - 5.34 show that on a positively charged surface, adsorption of both quinoline and its ion are affected by  $\pi$ -electron interaction. Optimum conditions for formation of a condensed layer are at  $\text{pH} > 5$  where the protonized form is absent. The curves show that there is a steady transition from adsorption to a typical condensed layer. The pH also affects the inhibition of cadmium ion neutralization by quinoline. With decreasing acidity of the medium, there is a symbatic change in the width and configuration of current dips on polarograms of cadmium with quinoline. Figures 2; references 9 (Russian).  
[177-83440972]

UDC 541.128.13

#### ELECTRICAL CONDUCTIVITY OF FERRISILICA GEL

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 50, No 2, Feb 84  
(manuscript received 14 Jun 82) pp 217-219

KOZUB, G.M., TISHCHENKO, V.A., BELETSKIY, I.P., ZARKO, V.I. and CHUYKO, A.A.,  
Institute of Physical Chemistry imeni L.V. Pisarzhevskiy, Ukrainian SSR  
Academy of Sciences, Kiev

[Abstract] A study was made of the electrical conductivity of laboratory-prepared samples of silica gel containing 0.0, 0.1, 5.0 and 20% iron. Measurements were made both in the powdered and pelletized forms by spring compression into a quartz tube at temperatures ranging from room to  $500^{\circ}\text{C}$  in air and under vacuum. The pure silica gel sample displayed measureable conductivity only after the first heating. Successive heatings resulted in no measurable conductivity, but the presence of 0.1% iron led to a noticeable change in conductivity. A comparison of experimental and literature data on resistivity indicate that resistivity changes are due to the presence of adsorbed water on the silica gel. Iron introduced to silica gel appears to be both in the hydroxide and ionic forms. Electron conductivity becomes possible in defective structure resulting from substitution of  $\text{Si}^{+4}$  ions with  $\text{Fe}^{+3}$  ions. The presence of an electron conductivity factor in a wide zone semiconductor such as ferrisilica gel may help to explain the mechanism of this type catalyst. Figures 4; references 6: 4 Russian, 2 Western.  
[177-83440972]

## FERTILIZERS

### USSR AGRICULTURAL-INDUSTRIAL PLAN FOR 1984

Moscow EKONOMICHESKAYA GAZETA in Russian No 5, Jan 84 p 1

[Article in the column "Five-Year Plan, Fourth Year": "Chemicalization of Agriculture"]

[Text] Yu.V. Andropov stressed in his address to the December, 1983 Plenum of the CPSU Central Committee, "As before, accomplishment of the Food Program requires great attention."

Measures associated with the utmost accelerated development of a united agricultural-industrial complex were specified in the State Plan for Economic and Social Development of the USSR for 1984 and in the budget of the country. The allocation to carry this out is 130 billion rubles. More than 33 percent of the total volume of construction for the national economy was devoted to capital outlays in the sector of the agricultural-industrial complex.

- Chemicalization of agriculture is being conducted on a large scale--one of the key directions for increasing the yield of fields and the productivity of animal husbandry. The production of mineral fertilizers and other chemical agents usable in agriculture is a component part of the agricultural-industrial complex.

It is evident from the accompanying diagrams [not reproduced in translation] that the production of mineral fertilizers (converted to 100 percent nutrient content) this year will comprise 31.2 million tons [according to plan], and this means an increase of 6.4 million tons in comparison to 1980.

The production of chemical agents for plant protection will be 575,000 tons of standard units, 101,000 tons more than in 1980.

The production of chemical feed additives will reach 800,000 tons (versus 548,000 tons in 1980).

The material base of the mineral fertilizer industry will be strengthened considerably. Capital outlays in this sector are being increased in 1984 by 24 percent [from 24.8 million tons in 1980 to 31.2 million tons in 1984, converted to 100 percent nutrients]. The introduction of a number of large-tonnage productions of synthetic ammonia, ammonium nitrate, carbamide, ammonium sulfate, ammophos, potash fertilizers and other agrochemical productions is provided.

Socialist competition at Minudobreniye enterprises is developing for early fulfillment of the tasks of 1984 and the Five-Year Plan as a whole. Many collectives accepted an obligation to exceed the planned goal for growth of labor productivity by 1 percent and to lower the production cost an additional 0.5 percent.

The development of the sector in 1984 is described on page 2 of this [source] publication by USSR Minister for Production of Mineral Fertilizers A.G. Petrishchev.

12410

CSO: 1841/148

## MINERAL FERTILIZER PRODUCTION PLANS OF USSR FOR 1984

Moscow EKONOMICHESKAYA GAZETA in Russian No 5, Jan 84 p 2

[Article by USSR Minister of Mineral Fertilizer Production A.G. Petrishchev in the column "Five-Year Plan, Fourth Year": "Production of Mineral Fertilizers"]

[Text] The resolution decreed by the 26th Plenum of the CPSU Central Committee and the Food Program of the country with respect to the task of intensification of agricultural production is inseparably bound with an increase in output and an improvement in the quality of chemical agents for increasing the yields of soils and the productivity of animal husbandry.

In the decree of the December, 1983 Plenum of the CPSU Central Committee the necessity was shown for constantly increasing the efforts of workers of the agricultural-industrial complex, an important constituent part of which is our industrial sector, according to the implementation of the USSR Food Program, by an increase in the yield of agricultural goods and the productivity of animal husbandry. Great attention was paid to this problem in Yu.V. Andropov's address.

I recall that in 1965, industry produced only 7.4 million tons of mineral fertilizers, and in the first year of the 11th Five-Year Plan, 26 million tons (converted to 100 percent content of nutrient substances) were produced. Thus, the production of fertilizers grew 3.5-fold. Noting the positive progress, the Politburo of the CPSU Central Committee at one of the sessions which met in August, 1983 paid special attention to available reserves of the sector and the bottlenecks slowing down its development. The staff of Minudobreniye took this very seriously.

### At the Border-Line of the Five-Year Plan

The collectives of the Ministry's enterprises and organizations overfulfilled the plan for fertilizer production in 1983 by 128.7 million rubles. Labor productivity increased by 7.8 percent compared to the 5.2 percent planned and because of this factor an 80 percent growth in productivity was achieved.

The cost of goods was 1.3 percent lower than planned. The plan was fulfilled to the limit of physical input per ruble of goods.

Phosphate fertilizers were manufactured at an accelerated rate to satisfy the shortages of them in farming. As the result, agriculture last year had 250,000 more tons of phosphate fertilizers than in 1982. The measures taken made it possible to make up during 1983 the underfulfillment of phosphate fertilizer production during the first two years of the Five-Year Plan.

The sector also successfully fulfilled the plan for 1983 for the production of nitrogen fertilizers and chemical agents for plant protection, partially compensating for shortfall incurred at the beginning of the Five-Year Plan.

At the same time the lag in potash fertilizer production persisted, although the volume of their output for 1983 rose by 1.2 million tons (15.2 percent). One of the reasons for this condition is that in spite of an overall marked improvement in the condition of business with transport for a number of enterprises, which are chiefly located in the Urals, there was a chronic shortage of railroad cars for shipping finished output. As the result, warehouse remainders of potash fertilizers in August to November rose by 150,000 tons. This led to underuse of the capacities of the industry. Especially then it was admitted that the potash fertilizer industry lagged behind the plan.

Shifts in the dates for installing and starting up a number of new production capacities also are reported negatively. Elimination of such bottlenecks of inter-sector and intra-sector disproportions will permit unfinished work to be completed and to go beyond the targets of the Five-Year Plan for this form of production also.

It should be noted that in addition to mineral fertilizers, chemical agents for plant protection have exceptionally great importance for agricultural productivity. Full mechanization of cultivation of the most labor-consuming crops became possible precisely due to the use of new broad-spectrum herbicides.

It was estimated that each ruble expended for chemical protection of plants from diseases, pests and weeds permits the saving of 7-8 rubles' worth of agricultural production. Whereupon the use of herbicides permits expenditures for mineral fertilizers to be saved and increases their effectiveness by 8-10 percent. It is clear that we consider this form of production one of the most important in our products list.

#### Basis of Technical Innovations

Under conditions of intensification of production, one of the most important conditions is the use of achievements of scientific-technical progress. For the mineral fertilizer industry in this respect introduction of machines having a higher unit capacity is typical.

In our enterprises units are functioning, each of which is calculated on an annual output of 450,000 tons of ammonia and ammonium nitrate, 500,000 tons of sulfuric acid, 300,000 tons of phosphoric acid, 131,000 tons of ammophos, 136,000 tons of nitroammophos and 112,000 tons of nitrophos. In comparison

to 1975, unit capacity for production of ammonia more than doubled, ammonium nitrate tripled, sulfuric acid and complex fertilizer production increased 1.5-fold and carbamide production increased 2.5-fold.

An example may be given to illustrate the economic effectiveness of high-capacity equipment. In carbamide production an increase in machine productivity from 1,000-1,500 tons per day more than doubles labor productivity and lowers energy expenditures by 45 percent.

In 1983, capacities for an output of 1.6 million tons of mineral fertilizers were put into operation. This is more than during the first two years of the Five-Year Plan. Productions of carbamide at the Nevinomyssk unit of Azot, of sulfuric acid at the Cherepovetsk unit of Ammophos and of apatite concentrate at the Apatit unit were able to be ahead of schedule.

In 1984, the introduction of large-tonnage production of synthetic ammonia is projected at various plants: nitrogen fertilizers at Cherepovetsk Azotnotuk and at Turkmen; ammonium nitrate at Dneprodzerzhinsk and Grodno units of Azot; ammonium nitrate in Berezniki; carbamide in Odessa; ammonium sulfate in Rustavi and ammophos in Kokand and Samarkand.

At the same time a wide variety of nature conservation measures is achieved. The introduction of large-tonnage machines promotes a decrease in atmospheric pollution. For example, modern large-scale production machines convert 99.8 percent of sulfur dioxide into sulfuric acid, and this eliminates the necessity for purification of waste gases.

All the new productions are characterized by improved technology, which yields less waste per unit of production. Much, but far from everything, has been done.

Now more than two-thirds of Minudobreniye enterprises generally do not discharge wastes into reservoirs. We shall self-critically be concerned when we see productions which still do not have effective means for environmental protection.

In 1984, about 80 million rubles of capital outlays were allotted to nature conservation measures in the industry. Thus, at the Meleuzovsk Chemical Plant in Bashkiria, biological cleaning installations with a capacity of 50,000 cubic meters per day will be introduced. They will be able to service not only our enterprise but also the whole business and city.

However, as noted in a recent session of the Politburo of the CPSU Central Committee, there are still cases at several enterprises of the industry which allow noncompliance with nature conservation measures and this leads to environmental contamination. We are taking steps to eliminate deficiencies in this matter.

Intensification of production and improvement in the quality and product assortment for the people occupy a prominent place in our plans. In 1983, their output increased more than 16 percent. In 1984, further growth is projected.



The product assortment for the industry includes mineral fertilizers in small packages and chemical agents for plant protection for personal secondary use. We shall completely satisfy the order of the USSR Ministry of Trade for these forms of production in 1984.

The assortment of preparations of chemical agents for plant protection for personal secondary use will almost double in comparison to the past year.

#### Initiatives of Labor Collectives

In the organization of plan implementation for 1984 we shall be ruled by the condition expressed by Yu.V. Andropov in his address at the December, 1983 Plenum of the CPSU Central Committee, "It is most important now not to lose the set tempo and total positive adjustment to the work and more actively develop positive processes." For us this is especially important, because the targets of 1984 for the total volume of industrial production, for production of mineral fertilizers and chemical agents for plant protection and goods for cultural and economic purposes exceed the targets which were set for the Ministry for this year by the Five-Year Plan.

In 1984, 31.2 million tons of mineral fertilizers (converted to 100 percent nutrient content) including 13.4 million tons of nitrogen fertilizers, 7.6 million tons of potash fertilizers were specified as the production quota. [These figures planned for 1984 are given in the illustration (not reproduced in translation) and the comparable production figures given for 1980 are 10.2 million tons of nitrogen fertilizers, 6.5 million tons of phosphate fertilizers and 8.1 million tons of potash fertilizers.] More than 570,000 tons of conventional units of chemical agents for plant protection will be produced.

The labor collectives of our enterprises are actively included in the competition for an above-plan increase in labor productivity and an additional decrease in production cost. Thus, workers at the Cherepovetsk Ammophos production unit on the basis of a further increase in the effectiveness of production, renovation of technological shops with the use of achievements of science and engineering and better organization of the work of the enterprise decided to establish an above-plan increase in labor productivity of 1.2 percent and an additional lowering of production cost by 0.6 percent. The commitments of the collective are influenced by a specific contribution to the realization of the Food Program of the country: the association will give agriculture 17,500 tons of mineral fertilizers above plan in 1984.

At the Dzhambulsk superphosphate plant the labor productivity is projected to be increased by 2.3 percent and production cost is to be lowered by 0.6 percent. The Voskresensk association of Minudobreniye and Grodno and Nevinnomysk Azot will exceed the target for an increase in labor productivity by a percent and will in addition decrease production cost by half a percent.

All our enterprises and associations should follow the example of these and other advanced collectives.

The central staff of Minudobreniye and colleagues of the Ministry in the first few days of 1984 took unremitting operational control of the method for implementation of the plan and of socialist commitment. The results of the first half of January attest to the total good adjustment to work and the aspiration of the labor collectives to exceed the targets of the Five-Year Plan. Bottlenecks also appeared, which must be eliminated as soon as possible.

More than half a million laborers, engineer-technical workers, clerks, specialists and scientists, hundreds of enterprises, shops and teams of the mineral fertilizer industry have now developed socialist competition for fulfillment and overfulfillment of plan targets and socialist commitments of 1984 and the 11th Five-Year Plan as a whole.

12410

CSO: 1841/148

## USSR AGROCHEMICAL SUBDIVISION FORMED

Moscow EKONOMICHESKAYA GAZETA in Russian No 5, Jan 84 p 2

[Article in column "Five-Year Plan, Fourth Year": "Agricultural Chemicals in the APK (Agro-Industrial Complex) System"]

[Text] In conformance with the decree of the CPSU Central Committee and the USSR Council of Ministers, the All-Union Industrial-Scientific Association for Agrochemical Service of Agriculture, Soyuzel'khokhimiya, was established. All responsibility for practical use in the economy of mineral and organic fertilizers, chemical and biological agents for plant protection, soil improvers, feed additives and concentrates, growth stimulants and other means for use of chemicals in agriculture is conferred upon its subdivision.

### Volume of Work is Growing

The subdividing of the agrochemical service implements the large volume of work and service connected with the introduction of chemicals into the agricultural economy. To indicate the scope of their activity it is sufficient to say that for three years of the Five-Year Plan the volume of work and service implemented by the Sel'khokhimiya associations comprised 23.1 billion rubles, including 7.2 billion rubles of a purely production character.

For the indicated period an area of 20.5 million hectares of soils were surveyed by Sel'khokhimiya associations, an area of 86.3 million hectares received mineral fertilizers and an area of 160.9 million hectares had chemical plant protection, including 100 million hectares by agricultural aviation. In addition 1,394 million tons of organic fertilizers were conveyed to the fields of kolkhozes and sovkhoses and 205.3 million tons of peat for fertilizer and bedding for animals were obtained.

The proportion of work to be implemented at the present time by the agrochemical service subdivision in total volume for the country comprises: for liming of acid soils, 95 percent; adding gypsum to brackish soils, 100 percent; servicing by agricultural aviation, 33 percent; export of organic fertilizers, 45 percent and their application, 35 percent. In the current year in comparison to last the volumes of agrochemical work will increase by 10.5 percent.

## In Response For the Harvest

However it should be noted that in the work of a number of Sel'khozkhimiya associations there are still serious deficiencies. The untimely implementation of agrochemical measures, low-quality materials and hence also low effectiveness of fertilizers and other chemical agents are frequently observed.

Up until recently the system of motivating Sel'khozkhimiya workers was not related to indexes of production of plant crops in the economies being served. Therefore, the agricultural service subdivision aimed to fulfill the volume of work and not to worry much about the yields of crops and the growth of production. Now this deficiency is removed.

By the decree of the CPSU Central Committee and the USSR Council of Ministers, "The Improvement of the Economic Interrelation of Agriculture with Other Sectors of the National Economy", an increase in responsibility of all enterprises and organizations serving kolkhozes and sovkhoses is foreseen, including Sel'khozkhimiya associations, for an increase in production and procurement of agricultural production, quality and time period for fulfilling work and service.

In connection with this, the order of payment of bonuses of agrochemical service workers was changed. Now they receive bonuses for an increase in production of plant crops in the economies served in comparison to the level achieved for the preceding five years, the fulfillment of agreed obligations for agrochemical service of the economy, an increase in quality of work implemented and a lowering of their production costs. Thus, material encouragement of workers by subdividing Sel'khozkhimiya is placed in a direct relationship to the final results.

12410

CSO: 1841/148

## FERTILIZER PRODUCTION OVERFULFILLED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 18 Feb 84 p 1

[Article by N. Kernoga: "Capacities Exceeded"]

[Text] Since the beginning of the year, the personnel of the Grodno Association "Azot" imeni S.O. Pritytskiy overfulfilled their assigned quotas by 27,000 tons mineral fertilizers and 40 tons of caprolactam. The entire increment was achieved by increased labor productivity.

Effective use of equipment helped to achieve the success. Its designed capacities have long since been exceeded, and therefore the mechanical repair, power and electrical maintenance services were the first enterprises in the branch to be centralized. This resulted in a significant increase in preventive maintenance and a decrease in down-time of units for repair.

83440972

CSO: 1841/162

USE OF FAT RESIDUE EMULSION FOR WATER REMOVAL FROM POTASSIUM ORE  
ENRICHMENT PRODUCTS

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 1,  
Jan-Feb 84 (manuscript received 1 Nov 82) pp 97-100

MOZHEYKO, F.F. and BUT'KO, Z.I., Institute of General and Inorganic Chemistry,  
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[Abstract] In the production of potassium fertilizers from ore tailings, there is a 2.4-3.0% loss in quality due to the salting-out of NaCl during the drying process. The presence of potassium chloride in the liquid phase in the product while stored in pile form results in 170,000 to 180,000 tons annual loss in KCl. Also, elimination of water requires great expenditures in heat energy. Since water is retained in the fertilizer chiefly by capillary force, nonionogenic surfactants such as OP-7, sintanol, DS-RAS, etc. are effective when added during the drying process. In order to be efficient, however, these products are required in large quantities and they are both costly and in short supply. It is therefore proposed to employ the bottom residue obtained from plant and animal fat rendering. It contains gossypol and its oxidation products, nitrogen and phosphorus compounds, fatty soaps and lactones. Although insoluble in water, it emulsifies readily in aqueous solutions of nonionogenic substances. Tests show that using this emulsion with nonionogenic wetting agent DB results in a 2% decrease in the water content of flotation tailings. Employment of this emulsion will accelerate the filtration process, lower KCl losses, improve the product and decrease the thermal expenditures. Figures 1; references 6: (Russian).  
[179-83440972]

UDC [546.13+546.668'15]

STUDY OF YTTERBIUM IODINATION

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 1, Jan 84  
(manuscript received 14 Apr 14 83) pp 27-30

MOLODKIN, A.K., KARAGODINA, A.M., DUDAREVA, A.G., KROKHINA, A.G. and  
TUPOLEV, V.S.

[Abstract] Iodination of metallic ytterbium was studied as a function of the temperature and duration of an experiment changing the heating regime at the rate of 8 to 10 degrees per minute. The degree of iodination of ytterbium increases with the increase of temperature from 300°C up to 900°C. Study of the relationship of the degree of iodination to the duration of the experiment showed that the ratio  $I:Yb \approx 3$ , which marks stoichiometry for ytterbium trioxide, is reached at 700, 800 and 900°C with samples remaining in the oven for 30 pp to 120 minutes.  $YbI_2$  is formed within the 738 to 778°C range and melts at 776 to 778°C and  $YbI_3$  is formed within the 776 to 778°C range and melts at 872°C. These values differ considerably from those presented in the literature. Figures 3; references 3: 2 Russian, 1 Western.  
[132-2791]

UDC 541.113

SPECIFIC HEAT AND THERMODYNAMIC PROPERTIES OF POTASSIUM PERCHLORATE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 1, Jan 84  
(manuscript received 17 Aug 82) pp 35-37

ZALUKAYEV, V.L., (deceased) GORBUNOV, V.Ye., SHARPATAYA, G.A. and BABAYEVA, V.P., Institute of General and Inorganic Chemistry imeni N.S. Kurnakov, USSR Academy of Sciences

[Abstract] Thermodynamic properties of potassium perchlorate were studied by low-temperature calorimetry. Specific heat of potassium perchlorate was measured in a vacuum adiabatic calorimeter in the 12K to 347K temperature range, producing 131 experimental points. Thermodynamic functions calculated on the basis of values obtained were  $C_p^0(298.15K) = 108.0 \pm 0.3$  J/K·mole;  $S^0(298.15K) = 150.1 \pm 0.4$  J/K·mole;  $H^0(298.15K) - H^0(0) = 20840 \pm 50$  J/mole;  $-G^0(298.15K)$

$-H^{\circ}(0)/T=80.20\pm 0.4$  J/K·mole. In contrast to the anomalous behavior of the specific heat of  $KClO_4$  in the 260 to 300K range noted earlier, the temperature dependence of the specific heat of anhydrous potassium perchlorate showed a smooth S-shape curve with no anomalous sections.

References 3: 2 Russian, 1 Western.

[132-2791]

UDC 546.718'841+546.719'841

#### THORIUM OXOPERTECHNETATE AND THORIUM OXOPERRENATE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 1, Jan 84  
(manuscript received 17 Aug 82) pp 179-182

ZAYTSEVA, L.L. and VAKHRUSHIN, A.Yu.

[Abstract] Thorium oxopertechnetate and thorium oxoperrenate were obtained by dissolving excess of thorium hydroxide in technecium acid and rhenic acid and were studied by chemical, thermal, x-ray phase and infra-red spectroscopic methods. Hexahydrates of the compounds obtained are fine-crystalline show-white powders, readily soluble in water, alcohol and acetone. They are hygroscopic and they deliquesce after long standing in air. Thermal analysis revealed the boundaries of stability of the hexahydrates and the temperature of their transition into anhydrous salts. Radiophasal analysis showed that the hexahydrates of the compounds are isostructural and that dehydration of oxoperrenate is accompanied by a change of structure. Radiography could not identify anhydrous oxopertechnetate because of its high hygroscopicity. Figures 3; references 9: 8 Russian, 1 Western.

[132-2791]

UDC 532.733

#### INFLUENCE OF NITRATES OF ALKALI METALS ON BORIC ACID SOLUBILITY

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 1, Jan 84  
(manuscript received 5 Nov 82) pp 233-235

TSEKHANSKIY, R.S., SKVORTSOV, V.G., MOLODKIN, A.K. and SADETDINOV, Sh.V.,  
Chuvash State Pedagogical Institute imeni I.Ya. Yakovlev; Friendship of  
Peoples University imeni P. Lumumba

[Abstract]  $H_3BO_3$ -- $MeNO_3$  ( $Me=Li, Na, K$ )-- $H_2O$  systems were studied by methods of isothermic solubility and refractometry at 25°C. Lithium nitrate and sodium nitrate salt out boric acid and potassium nitrate salts in boric acid. There is the same order of change of lyotropic effect in the nitrates and the chlorides. The nitrate ion and the chlorine ion have about equal capacity to interact with boric acid. The pH of the solutions is reduced in the presence of both halogens and nitrates. The analogous effect of chlorides and nitrates on boric acid solubility indicates the similar properties of  $Cl^-$  and  $NO_3^-$  ions shown by the solutions studied. This shows that the nitrate ion and chlorine ion have about the same capacity to interact with boric acid. Figure 1; references 8: 7 Russian, 1 Western.

[132-2791]



EFFECT OF LITHIUM OXIDE ON GLASS FORMING SYSTEM AND CERTAIN OTHER PROPERTIES  
OF GLASSES IN  $R_2O - SiO_2 - TiO_2 - ZrO_2$

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 1,  
Jan-Feb 84 (manuscript received 26 Nov 82) pp 3-6

BRAZGOVSKAYA, A.I. and KHODSKIY, L.G., Institute of General and Inorganic  
Chemistry, Belorussian SSR Academy of Sciences

[Abstract] The purpose of the present work was to establish the effect lithium has on the glass forming and other properties of titanium-containing glasses in respect to the system  $R_2O-SiO_2-TiO_2-ZrO_2$ . Data are presented in two tables showing the region of glass formation and changes in density, coefficient of linear thermal expansion, softening point temperature, chemical resistance to 8% NaOH and 20.24% HCl for 28 samples of varying composition. It was found that the glass forming region depends on the nature of the cation entering the glass composition. Partial substitution of sodium oxide with lithium oxide serves to confine the glass-forming region, lowers the coefficient of thermal expansion and increases the chemical resistance and density of the glass. Figures 1; references 15: 14 Russian, one Western.  
[179-83440972]

## NITROGEN COMPOUNDS

UDC 542.91:547.231:547.313.547.786

### NEW WAYS OF UTILIZING ALIPHATIC NITROCOMPOUNDS IN ORGANIC SYNTHESIS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan 84 (manuscript received 14 Jun 83) pp 165-173

TARTAKOVSKIY, V.A., Institute of Organic Chemistry imeni N.D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] The purpose of this article is to publicize a new possibility of utilizing aliphatic nitrogen compounds in organic synthesis by means of 1,3-dipolar cycloaddition of nitroesters to olefines. The reaction, discovered in the 1960's, led to the synthesis of a new class of organic compounds, the dialkoxy amines, and, for the first time made it possible to use all atoms entering the nitro group in structuring the skeleton of a new molecule. This reaction can include all types of nitrogen compounds capable of forming nitroesters including those having other functional groups, and almost any unsaturated compound. Structural formulas are presented and reaction mechanisms are conjectured on the basis of either a single stage sequential addition of reagents to an initial nitro compound, or as a two-stage process with separation of one of the intermediate products.

References 25: 18 Russian, 7 Western.

[157-83440972]

UDC 547.241

REACTIONS OF PHOSPHORYLATED THIOACETAMINES WITH MERCURIC OXIDE AND  
NUCLEOPHYLIC REAGENTS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 21 Apr 83) pp 88-91

DOL'NIKOVA, T.Yu., KOZLOV, V.A., GRAPOV, A.F. and MEL'NIKOV, N.N., All-Union  
Scientific-Research Institute of Chemical Means of Plant Protection, Moscow

[Abstract] In a continuation of the study of imine-enamine tautomerism in  
betaphosphorylated ketenaminomercaptals, a method was developed to prepare  
ketenaminoacetals and amineals that is based on the reaction of alpha-  
phosphorylthioacetamines with mercuric oxide in the presence of alcohols  
and aniline. The reaction products consist of either ketenaminoacetals or  
inino esters or an equilibrium mixture of both, depending on the substituents  
at the beta-carbon atom and at the nitrogen atom. Figure 1; references 3:  
2 Russian, one Western.  
[169-83440972]

UDC 547.341+541.623

TRIAD TAUTOMERISM OF THIOPHOSPHORYL-MERCAPTOILIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 28 Jul 82) pp 36-41

MASTRYUKOVA, T.A., ALADZHEVA, I.M., BYKHOVSKAYA, O.V., LEONT'YEVA, I.V.,  
PETROVSKIY, P.V. and KABACHNIK, M.I., Institute of Heteroorganic Compounds,  
USSR Academy of Sciences, Moscow

[Abstract] For the purpose of studying tautomerism in the thiophosphoryl-mercaptoilide system, a total of ten alpha-substituted thiophosphorylphosphino-methylenes were synthesized and their reactions with acids studied. It was found that within the potentially-tautomeric thiophosphoryl-mercaptoilide system equilibrium is entirely shifted either to the thiophosphory side, or to the mercaptoilide side, depending on the nature of the substituent on the central carbon atom. CH-phosponium salts containing thiophosphoryl and tosyl (carbethoxyl) groups were separated in the crystal state. References 16: 9 Russian, 7 Western.  
[169-83440972]

UDC 547.26'118

REACTIONS OF DERIVATIVES OF P(III) ACIDS WITH THIOKETONES AND PROPERTIES OF ADDITION PRODUCTS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 28 Jul 82) pp 41-47

ZIMIN, M.G., BURILOV, A.R. and PUDOVNIK, A.N., Kazan State University imeni V.I. Ul'yanov-Lenin

[Abstract] Ethylideneacetoacetic ester reacts with dimethyl- and diethylphosphorous acids by 1,4-addition although locoselectivity of the addition depends on the nature of the catalyst and on the nature of the hydrophosphoryl compound. It was found in the present work that reaction of dibutylphosphonic acid with ethylideneacetoacetic ester and phenylthiopyrotartaric acid takes place selectively at the C=S group.

The resulting dibutyl-1-mercaptoalkyl-phosphine oxide inhibits phosphonate-thiophosphate rearrangement. The reaction of ethylideneacetoacetic ester with sodium diisopropyl phosphite takes place primarily at the C=S group, while silylphosphites react by 1,4-addition. The structures of the products were confirmed by infra-red spectra. References 8: 7 Russian, one Western. [169-83440972]

UDC 547.26'118+547.341+547.345

ALKYL (TRIMETHYLSILYL)- $\alpha$ -(TRIMETHYLSILYLOXY)ALKYLPHOSPHONATES AND PRODUCTS OF THEIR DESILYLATION

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 8 Feb 83) pp 47-50

NESTEROV, L.V. and ALEKSANDROVA, N.A., Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Alkylbis (trimethylsilyl) phosphites react with carbonyl compounds at room temperature (aldehydes, acetylphosphonate), or at 100°C (ketones) to form alkyl(trimethylsilyl)- $\alpha$ -(trimethylsilyloxy)alkylphosphonates. These compounds hydrolyze to form monoalkyl- $\alpha$ -hydroxyalkylphosphonates. Figures 2; references 9: 7 Russian, 2 Western. [169-83440972]

UDC 541.124+547.26'118

REACTIONS OF DIMETHYLPHOSPHOROUS ACID WITH NUCLEOPHILIES OF VARYING RIGIDITY AND STRUCTURE OF SODIUM DIMETHYLPHOSPHITE IN METHANOL SOLUTION

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 8 Feb 83) pp 50-54

NESTEROV, L.V. and KREPYSHEVA, N.Ye., Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Mild ( $\text{CN}^-$ ,  $\text{R}_3\text{P}$ ) and intermediate ( $\text{N}_3^-$ ,  $\text{Me}_3\text{N}$ ) nucleophiles react with dimethylphosphorous acid at the methyl group, the mild electrophilic site. No signs of attack on oxygen proton could be observed. Sodium dimethylphosphite in methanol has a phosphorous atom with a coordination number equal to 3, but it is found to be in a state of rapid proton exchange with dimethylphosphorous acid causing an unstable  $\text{P}^{31}$  signal in the nuclear magnetic resonance spectra, depending on the relative quantities of salt and acid. The longevity of existence of sodium dimethylphosphite in solutions decreases with increasing content of free dimethylphosphorous acid. References 15: 7 Russian, 8 Western. [169-83440972]

## DERIVATIVES OF DIMETHYLCHLOROSILYLMETHYLPHOSPHONIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 24 Dec 82) pp 59-64

LIPTUGA, N.I. and YAREMENKO, V.V., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Trimethylchlorosilane reacts with phosphorus trichloride in the presence of oxygen to form dimethylchlorosilylmethylphosphonic acid dichloride. This product reacts with an excess of alcohols or phenols in the presence of triethylamine. It also reacts with excess of water to form products by substitution of three chlorine atoms. An excess of sodium fluoride, ethylene oxide, hydrogen sulfide, and even with one mole of water substitution products of only a single chlorine atom located at the silicon atom are obtained. References 8: 6 Russian, 2 Western.  
[169-83440972]

UDC 547.56+535.34/542.91

PERMUTATED ISOMERIZATION OF HEXACOORDINATED PHOSPHOROUS IN N,  
N-DIMETHYLBENZAMIDINIUM TETRAFLUOROPHOSPHATE INTO TETRAGONAL BIPYRAMIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 1 Feb 83) pp 71-75

NEGREBETSKIY, V.V., KAL'CHENKO, V.I., RUDYY, R.B. and MARKOVSKIY, L.N.,  
All-Union Scientific-Research Institute of Chemical Means of Plant Protection,  
Moscow; Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] A study was made of  $P^{31}$  permutated isomerization in N,N-dimethylbenzamidine tetrafluorophosphate using nuclear magnetic resonance spectra. The free energy of activation of permutated isomerization processes was found to be 23.6 kcal/mole. This confirms the high configurational stability of the hexacoordinated phosphorous tetragonal bipyramid. On the basis of theoretical analysis of temperature transformation of NMR spectra for  $P^{31}$ , and the independence of the process rate constant on the nature of the solvent, it is conjectured that permutated isomerization takes place via a regular mechanism with a simultaneous position change in four atoms of fluorine. Figures 5; references 16: 6 Russian, 10 Western.  
[169-83440972]

## EQUILIBRIUM CH-ACIDITY OF SOME METHYLENEPHOSPHORIC COMPOUNDS AND PHOSPHORUS-CONTAINING TRIPHENYLMETHANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 10 May 83) pp 82-85

TEREKHOVA, M.I., OSIPENKO, N.G., BONDARENKO, N.A., SUKHORUKOV, Yu.I., PETROV, E.S. and TSVETKOV, Ye.N., Scientific-Research Physical-Chemical Institute imeni L.Ya. Karpov, Institute of Physiologically Active Substances, USSR Academy of Sciences

[Abstract] Some facts concerning the effects of phosphoryl and thiophosphoryl groups on adjacent CH-bonds were established while studying the equilibrium CH-acidity of organophosphorous compounds. In the present work data are presented on the degree of interaction of two similar groups in the alpha-position and one group in the para-position of a phenyl ring simultaneously on the CH-acidic site. The effects of the diphenylphosphoryl and diphenylthiophosphoryl groups are contrasted with the effect of the diphenylphosphine group. It was found that equilibrium CH-acidity of  $X_2CH_2$  and  $p-XC_6H_4CHPh_2$  type compounds decreases in the order  $X: R_2PS > R_2PO > R_2P$ . In the  $X_2CH_2$  series of compounds the variance in the effects between  $R_2PS$  and  $R_2PO$  groups increases approximately by one  $pK_a$  unit when substituting  $R = Ph$  for  $R = Me$ . References 12: 7 Russian, 5 Western.  
[169-83440972]

UDC 547.241+547.73

## BETA-(THIENYL-2)VINYLDICHLOROPHOSPHINE AND SOME OF ITS REACTIONS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 6 Apr 83) pp 91-96

KHAYRULLIN, V.K., SHAGIDULLIN, R.R., VASYANINA, M.A., POKROVSKAYA, I.K. and CHERNOV, A.N., Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Phosphorylated derivatives of vinylthiophene are not described in the literature. In the present work, vinylthiophene was treated with phosphorus pentachloride in phosphorus trichloride solution. The resulting adduct was decomposed with methyldichlorophosphite to obtain beta-(thienyl-2)vinyldichlorophosphine. It is shown that vinyl protons are in a trans-position in relation to one another. The diethyl ester of beta-(thienyl-2)vinyldichlorophosphine reacts vigorously with ethyl iodide, acrylic and methacrylic acids and carbon tetrachloride to form the corresponding ethyl esters. The acidic ethyl ester of beta-(thienyl-2)vinyldichlorophosphine reacts by addition to the carbonyl group of aldehydes. With ketones there is no reaction. References 14: 9 Russian, 5 Western.  
[169-83440972]

## THERMAL REARRANGEMENT OF SIOXYPHENYLENEISOCYANATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 17 Feb 83) pp 139-145

CHIKINA, N.L., KOLODYAZHNYI, Yu.V. (deceased), KOZYUKOV, V.P., MIRONOVA, N.V. and OSIPOV, O.A., Scientific Research Institute of Physical-Organic Chemistry of the Rostov State University imeni M.A. Suslov; State Scientific Research Institute of Chemical Technology of Heteroorganic Compounds, Moscow

[Abstract] A study was made of the isomerism of siloxy-substituted 1, 2-diphenyleneisocyanates. Upon heating, 2-siloxyphenyleneisocyanate undergoes intermolecular rearrangement to form N-trimethylsilylbenzoxazolones. A study of the isomerization kinetics indicates that it takes place in two stages, it is a second order reaction and it is characterized by high energy barriers. Figure 1; references 8: 7 Russian, one Western.  
[169-83440972]

UDC 547.241

## NEW REPRESENTATIVE OF DIAZADIPHOSPHETIDENES OF BIPOLAR STRUCTURE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 28 Jun 83) pp 216-217

FILONENKO, L.P., POVOLOTSKIY, M.I. and PINCHUK, A.M., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Only recently the first two representatives of bipolar diazadiphosphetidenes were synthesized by substituting one or two fluorine atoms in 1,3-dialkyl-2,2,2,4,4,4-hexafluoro-1,3-diaza-2,4-diphosphetidenes for a sterically volumetric tertiary butyl group or a  $-N(CH_3)CH_2CH_2N(CH_3)-$  group. In the present work the authors succeeded in synthesizing the first bipolar representative of a diazadiphosphetidene having chlorine atoms at the phosphorus position, i.e., 1-methyl-3-tert-butyl-2,2-dichloro-4,4,4,4-tetrachloro-1,3-diaza-2,4-diphosphetidene by using the same method. Treating this compound with sulfur dioxide in benzene solution at 10 - 15°C resulted in the formation of 1-methyl-3-tert-butyl-2,4-dioxo-2,4-dichlorodiaza-diphosphetidene. References 3: one Russian, 2 Western.  
[169-83440972]



## FORMATION OF COMPOUNDS OF PENTA AND HEXA-COORDINATED PHOSPHORUS IN REACTIONS OF TRIALKYLTRITHIOPHOSPHITES WITH PYROCATECHIN

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 29 Mar 83) pp 218-219

KOSTIN, V.P., SINYASHIN, O.G., BATYYEVA, E.S. and PUDOVNIK, A.N., Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] It is demonstrated that trithio esters of phosphoric acid react with pyrocatechin in 1:2 ratio to form bis(o-phenylenedioxy)-phosphoranes and mercaptans. If equimolar quantities of the reactants are used, 50% of the thiophosphite fail to react. In the presence of aliphatic and certain cyclic amines, trialkyltrithiophosphites react with pyrocatechin in 1:3 ratio to form ammonium salts of the phosphate. References 3: one Russian, 2 Western.

[169-83440972]

## REACTION OF CHLOROPHOSPHINES WITH TRICHLOROACETIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 29 Mar 83) pp 219-220

SINYASHIN, O.G., KARIMULLIN, Sh.A., BATYYEVA, E.S. and PUDOVNIK, A.N., Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] It has been previously shown that diphenylchlorophosphine reacts with trifluoroacetic acid to form 1-[diphenylphosphinyl]-2,2,2-trifluoroethyl-diphenylphosphinate and trifluoroacetyl chloride. Chlorophosphines also react with acetic acid in a similar manner. In the present work it is established that in contrast to this, diethyl-, ethylphenyl- and diphenylchlorophosphines react with trichloroacetic acid to form the corresponding chlorophosphinates and dichloroacetyl chloride. References 6: 2 Russian, 4 Western.

[169-83440972]

SYNTHESIS OF NEW PHOSPHORUS-CONTAINING POLYHEDRIC COMPOUND--2-PHENYL-  
-2-PHOSPHAADAMANTANE-4,8-DIONE 2-OXIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 11 Apr 83) pp 220-221

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Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Data are presented on the synthesis of previously unknown 2-phosphaadamantane derivatives. To build an adamantane carcass with a phosphorus atom in a bridge position, the authors used a previously known methodology for the synthesis of 2-thiaadamantane. Bicyclo[3.3.1]nonane-2,6-dione was used to obtain 2,6-bis(morpholino)bicyclo[3.3.1]nonane-1,5-diene. This then reacts with phenyldichlorophosphine to close the 2-phosphaadamantane carcass and for the bis-imine salt. References 2: both Western. [169-83440972]

UDC 547.341

BISPHOSPHORYLATION OF N-VINYL-N-CHLOROVINYLAMINES ON BASIS OF  
N-VINYL-N-BUTYLACETAMIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 10 Jun 83) pp 222-223

ROZINOV, V.G., IZHBOLDINA, L.P., DONSIKH, V.I. and DOLGUSHIN, G.V., Irkutsk  
State University imeni A.A. Zhdanov

[Abstract] Reactions of phosphorus pentachloride with acetamides and enamines containing an acceptor substituent on the nitrogen atom may be used as a means for preparing phosphorus-containing enamines. From this it may be expected that tertiary acetamides, having a vinyl group at the nitrogen atom, would react with  $PCl_5$  both at the double bond and at the acetal group. It was found that N-vinyl-N-butylacetamide reacts with  $PCl_5$  to form the bisphosphorylated product. Apparently, hexachlorophosphate is an intermediate product in this reaction. References 4: 3 Russian, one Western. [169-83440972]

## PHOSPHORYLATION OF N-(beta-OXYETHYL)-2-PYRROLIDONE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 23 Feb 83) pp 224-225

GUREVICH, P.A., KISELEV, V.V. and MOSKVA, V.V., Kazan Chemical-Technologic  
Institute imeni S.M. Kirov

[Abstract] Transesterification of trialkylphosphites with N-(beta-oxyethyl-  
2--pyrrolidone resulted in the corresponding dialkyl-beta-(N-2-pyrrolidonyl)-  
-ethylphosphite.  
[169-83440972]

2-X-4-METHOXY-4-OXO-1,3,2,4-DIOXADIPHOSPHORINANES--NEW CLASS OF DIPHOSPHORIC  
SIX-MEMBERED HETEROCYCLIC COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 8 Jun 83) pp 225-226

GAZIZOV, M.B., ZAKHAROV, V.M., KHAYRULLIN, R.A., MOSKVA, V.V., MUSIN, R.Z.,  
YEFREMOV, Yu.Ya. and SAVEL'YEVA, E.I., Kazan Chemical-Technologic Institute  
imeni S.M. Kirov; Institute of Organic and Physical Chemistry imeni A.Ye.  
Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] The authors found for the first time that O,O-dimethylphosphoryl-  
ethyldichlorophosphite undergoes heterocyclization on heating and splitting  
off an alkyl halide. This results in the formation of a new six-membered  
heterocyclic system having two phosphorus atoms with different coordination,  
i.e., 2-chloro-4-methoxy-4-oxo-1,3,2,4-dioxadiphosphorinane. The structure of  
the new compound was confirmed by conversion into the ester and the diethyl  
amide.  
[169-83440972]

SYNTHESIS OF N-SUBSTITUTED  $\alpha$ -AMINOARYLMETHANEPROPADIENEPHOSPHINIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 1, Jan 84  
(manuscript received 2 May 83) pp 226-228

BELAKHOV, V.V., YUDELEVICH, V.I., KOMAROV, Ye.V., IONIN, B.I. and PETROV, A.A., All-Union Scientific-Research Technological Institute of Antibiotics and Medically Designated Enzymes, Leningrad; Leningrad Technological Institute imeni Lensovet

[Abstract] Studying the reactivity of allenephosphinic acids, the authors discovered that reaction of propadienephosphinic acid with benzal aniline and N-(p-bromobenzylidene)-p-bromoaniline or its components, results in the formation of N-substituted  $\alpha$ -aminoarylmethanphosphinic acid. The structure of this compound was determined with nuclear magnetic resonance spectra and infra-red spectra, and its composition by element analysis. References 9; 7 Russian, 2 Western.  
[169-83440972]

UDC 66.094.187.3:547.213

STUDY OF PROPANE DEHYDROGENATION REACTIONS OVER ALUMINA-  
CHROMIA-POTASSIA CATALYST

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83 pp 3-6

DADASHEV, B.A., SARYDZHANOV, A.A., MEKHRALIYEVA, L.A., YUNUSOVA, F.A.,  
KADYROVA, A.A. and RASULZADE, Z.A., Institute of Petrochemical Processes,  
Azerbaijan SSR Academy of Sciences imeni Yu.G. Mamedaliyev

[Abstract] Research and development of catalysts for the dehydrogenation of  $C_4 - C_5$  paraffin hydrocarbons has been going on for many years at the Institute for Petrochemical Processes, and has resulted in the development of an alumina -chromia-potassia catalyst which differs from others in that it used an industrial grade fluorinated gamma-alumina (TU 38-365-69). The effects of temperature at 560°-610°C and 400-1000 liters/hour throughput velocity on the activity of this catalyst in propane dehydrogenation were studied. It was found that at the above parameters, maximum propylene yield occurs at 580°C and 400-600 liters/hour, and comprises 44.6% at 85.8% selectivity. After periodic regeneration and 1500 hours use in propane dehydrogenation, the catalyst's activity remained unchanged. Figures 4; references 5: (Russian). [155-83440972]

UDC 661:471.7:542.87

ELECTROCHEMICAL METHOD FOR SEPARATING IODINE FROM WELL WATERS THROUGH  
IODATES

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 83  
pp 143-146

SHABANOV, A.L., RASULBEKOVA, R.A., MUKHIN, O.S. and FARADZHEV, A.D., Azerbaijan  
Institute of Oil and Chemistry imeni M. Azizbekov

[Abstract] Iodine is removed from well water by first treating it with 0.22N sulfuric acid followed by electrolysis with 50 Hz alternating current to oxidize the iodide ions to iodate. Electrolysis is conducted between cylindrical graphite electrodes of grade "Gamma S" spaced 8-10mm apart without heating or the use of diaphragms. By using the less costly

alternating current, a 2.5-fold saving over current methods is realized. Diaphragms and anode insulation are not required, electrodes are not contaminated, chemical reagents are not needed, and there is no resulting air pollution. Figures 4; references 7: (Russian).  
[155-83440972]

UDC 547.537:547.3

#### ALKYLATION OF BENZENE WITH ALPHA-OLEFINS OVER $Al + CCl_4$ CATALYST SYSTEM

Baku DOKLADY AKADEMII NAUK AZERBAYDZHANSKOY SSR in Russian Vol 39, No 8, Aug 83 (manuscript received 8 Sep 81) pp 46-49

MAGERRAMOV, M.N., USUBOVA, E.N., ZOKHRABBEKOVA, E.Z. and FARKHADOVA, S.M., Azerbaijan State University imeni S.M. Kirov

[Abstract] High molecular alkylbenzenes containing normal alkyl radicals are widely used in the manufacture of detergents, lubricant additives, emulsifiers, etc. To obtain these products, aromatic hydrocarbons are alkylated with alpha-olefins in the presence of such catalysts as  $AlCl_3$ ,  $BF_3$ ,  $H_2SO_4$ ,  $H_3PO_4$  and HF. High catalyst consumption and low yields make these catalysts less than ideal. In the present work a study was made of the alkylation of benzene with  $C_8 - C_{20}$  alpha-olefins in the presence of a catalyst system consisting of metallic aluminum and carbon tetrachloride. It is shown that in the presence of 0.013 moles of  $CCl_4$  and 0.0074 gram-atoms of aluminum, one gram-mole of olefin reacts with benzene and toluene. The resulting alkyl-toluenes consist of a mixture of ortho-, meta-, and para-isomers, with the para-isomer predominating. This catalyst system was also shown to be more active than  $AlCl_3$ . Figures 2; references 14: 5 Russian, 9 Western.

[171-83440972]

UDC 621.512-222:621.892.092  
678.742.23

#### DETERMINING OPTIMUM LUBRICANT CONSUMPTION FOR COMPRESSOR CYLINDERS OF HIGH PRESSURE POLYETHYLENE PRODUCTION EQUIPMENT

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 1, Jan 84 pp 19-21

ZAVOYKO, A.M., NOVIKOV, I.I. and SIRENKO, G.A., candidates of technical sciences; DOTSENKO, V.A. and CHEPURKO, L.A., engineers

[Abstract] An important maintenance consideration at high-pressure polyethylene plants is choice of mounting lubricants. Orites-210DS from ELF(France) and Union Carbide's Ucon 75H are commonly used. These lubricants, however, often end up in the final product. The authors studied Orites-210DS in piston and plunger lubricators in compressors reaching 220 MPa,

reducing lubricant feed from 41.5 to 14 kg/hour in a first test series, then increasing it to 18.2 kg/hour in a second. Mounting wear and the presence of lubricant in the final polyethylenewere monitored. Data showed considerably less lubricant in the final product, along with a 30% production increase. Increased productivity brought consistently less impurities, but mountings wore out faster: in the first cylinders there useful life fell from 6 to 2-3 months, and in the second-stage cylinders, from 12 to 6-8 months. Reduced lubricant feed and acceptance of mounting wear is recommended, until new synthetic lubricants and more durable mountings can be developed. Figures 3. [150-12131]

UDC 615.31:546.13].015.4.073:539.196.3

INTERMOLECULAR REACTIONS AND BIOLOGICAL ACTIVITY OF CHLORINE CONTAINING COMPOUNDS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 1, Jan 84  
(manuscript received 23 Nov 82) pp 17-25

MUKHOMOROV, V.K., Military-Medical Academy imeni S.M. Kirov, Leningrad

[Abstract] The relationship of the biological activity of 12 chlorobenzene derivatives to number, type, and position of the substituent in the benzene ring was analyzed. After allowing for the presence of foreign bodies in the biophase, the bioactivity of the chlorine derivatives appears to be determined solely by the electron structure of those compounds characterized by their capability to form complexes through intermolecular reaction. Apparently, after association with the active site of the receptor, the chloro-derivative then interferes with the normal functioning of the biosystem by irreversibly disrupting its vital processes. Furthermore, when the donor level is greater than that of the receptor, actual transfer of electrons is possible. In this case, energy is lost through indirect relaxation mechanisms. This energy is then expended on the disruption of the equilibrium-ordered structure of the receptor. References 21: 9 Russian, 12 Western.  
[156-83440972]

UDC 615.281:547.379.1]012.1

SYNTHESIS AND BIOLOGICAL ACTIVITY OF ORGANYLTHIOSELENIDES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 1, Jan 84  
(manuscript received 27 Jun 83) pp 26-28

GUSAROVA, N.K., KUZNETSOVA, E.E., POTAPOV, V.A., PUSHECHKINA, T.A.,  
FEDOSEYEV, A.P., KIRDEY, Ye.G., AMOSOVA, S.V., TROFIMOV, B.A., Irkutsk  
Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences;  
Irkutsk Medical Institute; Siberian Branch, All-Union Scientific Center of  
Surgery, USSR Academy of Medical Sciences, Irkutsk

[Abstract] 2(Organylthio)ethylvinyl selenide (I) and 2,2 - di(organylthio) diethyl selenides (II) were synthesized and their biological activity studied.



Four homologues of each series were prepared by reaction of divinyl selenide with an alkylthiol. Acute toxicity and antitumor activity studies were conducted on white mice of both sexes. Two derivatives of (II) inhibited the growth of white staphylococcus and sarcina at doses of 50 mcg/ml. The remaining organylthio selenides were ineffective at concentrations of 200 mcg/ml. Tables, 2; references 11: 4 Russian, 8 Western.  
[156-83440972]

UDC 615.277.3:547.236.2].099

#### QUANTUM-CHEMICAL STUDY OF ANTITUMOR AND TOXIC ACTIVITIES OF PHENYLTRIAZINES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 1, Jan 84  
(manuscript received 15 Dec 82) pp 34-39

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[Abstract] A quantum-chemical approach was used to investigate the antitumor activity and toxicity of 1-phenyl-3,3-dialkyl-triazines. Equations were derived which were used to compute toxicity (LD<sub>50</sub>) and activity against sarcoma S-180 (pC<sub>130</sub>) for 14 derivatives of phenyltriazine. These equations can be used to predict the behavior of an analog and make it possible to select a compound with maximum antitumor activity and minimum toxicity. Figure 1; references 14: 6 Russian, 8 Western.  
[156-83440972]

UDC 615.281:547.551.525.211.1].012.1

#### SYNTHESIS AND CHEMOTHERAPEUTIC ACTIVITY OF SOME NEW p-SULFAMOYLBENZYL (PHENETHYL) AMIDES OF BENZOFURAN-2-CARBOXYLIC ACID AGAINST STAPHYLOCOCCUS INFECTION

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 1, Jan 84  
(manuscript received 11 Apr 83) pp 58-61

KALDRIKYAN, M.A., GEBOYAN, V.A., TER-ZAKHARYAN, Yu.Z. and PARONIKYAN, R.V., Institute of Fine Organic Chemistry imeni A.M. Mndzhoyan, Armenian SSR, Academy of Sciences Yerevan

[Abstract] Seven new benzenesulfanyl amides containing benzo-furoyl-2-amidoalkyl groups were synthesized by first treating phenylalkyl amines with a benzofuran-2-carboxylic acid chloride followed by sulfochlorination of the resulting acid amides with an excess of chlorosulfonic acid. The chemotherapeutic activity of the new compounds was investigated on a model generalized staphylococcus infection in white mice. The results showed that six of the compounds have marked chemotherapeutic activity and that the search for more new sulfonamides containing benzofuran groupings should continue. References 6: 3 Russian, 3 Western.  
[156-83440972]

## SYNTHESIS AND ANTISILICOTIC ACTIVITY OF N-VINYLPYRROLIDONE AND VINYLGLYCIDYL ETHYLENE GLYCOLATE COPOLYMERS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 1, Jan 84  
(manuscript received 11 May 83) pp 61-64

MOROZOVA, L.V., MINAKOVA, T.T., TIZENBERG, G.M., KUZNETSOV, I.G., VORONKOV, M.G. and TROFIMOV, B.A., Irkutsk Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences

[Abstract] Prophylaxis of pneumoconiosis is one of the most pressing problems of labor hygiene. In a search for new high molecular compounds having antisilicotic activity, the authors investigated the copolymerization of N-vinylpyrrolidone with vinylglycidyl ethylene glycolate in the presence of azobisisobutyric acid dinitrile as initiator. Under free radical conditions, the copolymerization proceeds selectively at the double bonds and results in a straight-chain product having pyrrolidone and epoxy side rings. Antisilicotic activity was tested on white rats subjected to either silica inhalation or intratracheal infusion of silica in saline solution. The new copolymer was found to be effective in suppressing silicotic processes in a live organism and had no negative side effects. References 9: 8 Russian, 1 Western.  
[156-83440972]

## PHARMACOLOGICAL CHARACTERISTICS OF DERIVATIVES OF BENZO[f]QUINOLINE

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 1, Jan-Feb 84 (manuscript received 24 May 83) pp 77-81

KULESHOV, V.I., KOZLOV, N.C., KOSMACHEVA, I.M., KOSMACHEV, A.B., STROYKOVA, G.S. and ZHIKHAREVA, O.D., Institute of Physical-Organic Chemistry, Belorussian SSR Academy of Sciences; Institute of Toxicology, USSR Ministry of Health, Leningrad

[Abstract] Derivatives of benzo[f]quinoline possess antiviral and anticholinesterase activity. A study was made of some of the pharmacological properties of methyl-p-toluenesulfonates of 1-methyl-(ethyl)-3-arylbenzo[f]quinoline. Five quaternary salts of benzo[f]quinoline were tested for acute toxicity, morphological alteration of the internal organs of mice and rats after administration of toxic doses, capability to alter involuntary motor activity, effect on soporific activity of chloral hydrate, barbital and medinal, as well as the effect on brain and muscular cholinergic structures. It was found that although the benzo[f]quinoline derivatives inhibit cholinesterase in the brain and blood of mice, their toxicity is not due to this effect. The quaternary salts have no effect on the muscular and brain cholinergic systems. The compounds do have an inhibiting effect on the central nervous system which may possibly be the basis for their toxicity. Figures 3; references 13: 8 Russian, 5 Western.  
[179-83440972]

SYNTHESIS AND PHARMACOLOGICAL ACTIVITY OF QUATERNARY AMMONIUM SALTS OF  
CERTAIN BISINDOLES AND PYRROLOINDOLES OF VARIOUS STRUCTURE

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 1, Jan 84  
(manuscript received 23 Jun 83) pp 29-31

[Abstract] Mannich's reaction was used to prepare a total of 12 quaternary ammonium bisindoles and pyrroloindoles. The structures of the compounds were confirmed by IR, UV, and PMR spectra. Three of the compounds were found to block neuromuscular activity in anaesthetized cats. Three other compounds caused a short term increase in arterial pressure to 40-80 mm mercury and stimulated respiration. The results further indicated that bisquaternary ammonium derivatives of indole include compounds with moderate curariform, ganglioblocking, and nicotinoform properties. References 10: 9 Russian, 1 Western.

[156-83440972]

## POLYMERS AND POLYMERIZATION

### ORGANIC METALS AND SEMICONDUCTORS

Yerevan KOMMUNIST in Russian 14 Feb 84 p 4

[Article by A. Matnishyan, doctor of chemical sciences, division chief, Armenian Branch, All-Union Scientific-Research Institute of Chemical Reagents and Very Pure Chemical Substances: "Organic Metals and Semiconductors"]

[Text] Traditionally, chemists occupied themselves preparing new, sometimes unexpected materials. This work continued since the middle of the last century and allowed an enormous number of compounds to be accumulated whose properties were still not well known. The development of the chemistry of high molecular compounds, polymers, led to marked increase in the assortment of compounds which were used in various areas of technology. Throughout the branches of the national economy at first those compounds were used whose properties were similar to those of naturally occurring ones.

#### The Search for New Polymers

The economy, however, kept demanding newer and better materials. Technology forced harsh requirements on them. Then came the age of the scientific and technical revolution. A clear example is the history of the development of directed synthesis and application of polymers. If in the 1950's polymers still fell short of metals in strength, but nevertheless began to compete with them, 10 to 15 years later composite materials appeared which exceeded the best steels in strength.

The next stage in development was increased resistance of polymeric materials to high temperatures. At the present time, there are a number of materials which can withstand temperatures in excess of 2000°C and can function steadily at temperatures at which the strength of steel drops significantly.

Since the creation of photopolymerizing polymeric compositions, photolithography became widely used. The availability and low cost of light sensitive polymers made it possible to use them widely for information storage, copying, and especially in microelectronics. At the present time polymers are used in microelectronics as materials for photo-, electronic- and gamma-resistors and functional resistors. The arrival of polymers having weak electrical conductivity in the presence of light immediately made it possible to use them for electrophotography. The low photoconductivity of these materials was a premise for the development of compositions with high conductivity.

One of the first materials which realistically manifested the huge possibilities of polymers was sulfur nitride, a fibrous, crystalline product. It not only had metallic conductivity, but was a superconductor at low temperatures. This was such an unexpected development that up until the present time physicists have not been able to fully explain the mechanism of conductivity.

This was immediately followed by the discovery of a new class of crystalline complexes with charge transfer, which in their electrical conductivity exceeded many metals and found themselves to be on the same level with copper. These were "monomeric organic highly conductive systems". There are now three representatives of this class of substances which are superconductors at low temperatures, and theoreticians predict that these materials will be superconductors at ordinary temperatures.

The development of superconductors solved a number of problems and made it possible to reach a higher level of development, especially in scientific instrument building. Even now, to obtain powerful magnetic fields it is not possible to use copper conductors in electromagnet coils, because even with copper as conductor, the amount of heat given off from the resistance is enough to melt the coil. For this reason, modern instruments used to study the structure of substances employ coils having superconductor materials.

It may be said that the above studies served as the start of an avalanche-like growth in amount of work in the field of organic metals and semiconductors. Over the past three years more than a thousand works have been made and published in different countries. It became necessary to start two new scientific journals to publish the information. The major electronic companies in foreign countries are engaged in the development of the new instruments.

#### Remarkable Polyacetylene

At this time, having improved the synthesis of acetylene polymers, long since considered "direct" and unpromising products, it became possible to obtain a regular crystalline polymer. By introducing 1-2 percent of an admixture, it can alter its electrical conductivity by a trillion times! Strictly speaking, this means that polyacetylene in pure form is a dielectric and through alloying passes through a semiconductor state into that of a metal.

But this is not the main reason for the boom surrounding polyacetylene. The fact is that polyacetylene, in contrast to known polymers, is insoluble in anything and does not melt. Only by compressing its powder is it possible to make an integrated circuit or some other device, but then the properties of the polymer are sharply reduced. The powder pressing method is thus not suitable for making electronic devices.

It became necessary to grow a nondefective film of polymer on a given surface. Chemists were able to solve this problem.

From one kilogram of polyacetylene it is possible to obtain a film with a surface greater than 200 square meters. And if it is used to make photoconverters, then the electrical energy obtained from such batteries is enough to meet the needs of a building whose roof is covered with these converters.

Polyacetylene turned out to be a remarkable material. Aside from a variety of semiconductor materials and devices, today we have batteries whose electrodes consist of polyacetylene film. The characteristics of such batteries exceed those of lead batteries by ten times. Furthermore the toxicity of lead and its compounds is well known. A single discarded battery pollutes the surrounding environment for a radius of over one kilometer.

Polyacetylene is almost 20 times lighter than lead, so that its use will simplify designing and make it possible to design cells capable of providing very large currents. This could result in large economic effect.

With a conventional battery an automobile today can travel an average of 30-40 kilometers. Theoretically, with a polyacetylene battery, this could be 300-400 kilometers, making them realistic for practical use.

According to the predictions of western companies, serial production of batteries using organic electrodes is expected in 1985. The widespread output of electric automobiles in the coming years thus becomes realistic.

Such an "explosive" development of research in the field of organic metals, semiconductors and composites took place in the past five years that the results acquired by the specialists are still not sufficiently assimilated. In this field it would seem that all specialties became "confused": physicists are often occupied with the preparation, while chemists study the properties of these materials. Full interaction between them has not yet been established. The matter is further aggravated by the fact that organic semiconductor materials do not all resemble traditional semiconductors, and the methodology for studying them is different. On the other hand, the material is obtained by chemists but studied by physicists, and the institutes in which it is possible to both obtain and study organic semiconductors at the same time are lacking. This field of research requires new types of personal contact between specialists. This prevents us from conducting the work effectively and arriving at practical application more quickly.

A few words about the ecological aspects related to the preparation of organic semiconductors, polyacetylene in particular. This is one of the few chemical processes which can take place in a closed cycle without polluting the surrounding environment. Taking into account the features of our republic, the difficulties in restoring ecological equilibrium should serve as one of the incentives in the near future to establish "small scale" chemistry which will determine to a large degree the prospects of the scientific and technical development of our country.

83440972  
CSO: 1841/162

NEW POLYAMIDE FILM DEVELOPED BY PLASTMASSY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 26 Jan 84 p 1

[Article: "Wonder Film"]

[Text] A new brand of polyamide film developed by staff members of the Moscow Plastmassy Scientific-Production Association in no way differs in external appearance from ordinary cellophane. However in "internal" characteristics it far surpasses its predecessor. For example, it may, without changing essential properties, withstand temperatures from minus 200 to plus 300 degrees. At a thickness of all of 40-60 microns it is capable of bearing a load of hundreds of kilograms. In addition, the new product is resistant to ultraviolet radiation, does not burn in a flame and is not soluble in organic solvents. Such valuable "characteristics" of the film have attracted the attention of specialists from different sectors of the national economy.

12410

CSO: 1841/148

## FROST-RESISTANT POLYMER

Moscow SOVETSKAYA ROSSIYA in Russian 13 Feb 84 p 4

[Article by A. Orlov, Yakutsk ASSR: "Polymers Against Frost"]

[Text] I have in the palm of my hand several round objects. They are packing gaskets and rings made of polymers. At first glance there is nothing extraordinary about them at all, and it even seems strange that they are the subject of extensive and grave research.

The work began with a concrete problem assigned to a production engineer. But as so often happens in science, one idea led to another and the limitations of the search broadened to encompass yet newer spheres. Finally, the matter became so important that it led to the creation of a new scientific subdivision.

These were not ordinary parts shown to me at a laboratory of the Institute of Physical-Technical Problems of the North, Yakutsk Branch, Siberian Department USSR Academy of Sciences. What is their secret?

"They don't fear frost", explained Deputy Director of the Institute, Doctor of Technical Sciences, Professor I.N. Cherskiy. "Our cold weather, if it may be so stated, literally "devours" the lifetimes of vehicles and mechanisms. At fifty or sixty degrees below zero, their useful lifespan is reduced by two or three times and their productivity is lowered two-fold. Hydraulic, fuel and lubrication systems especially suffer greatly. With this kind of frost rubber packing rings become brittle and crumble readily. Liquids leak through the cracks, and high powered vehicles become disabled and become lifeless masses of metal.

It's impossible to stock enough spare parts. And if imported as well as domestic equipment is used in working the mine fields, any stoppages lead in the final analysis to additional expenditure of committed funds.

"There are still many problems, and it will not be soon that we know the answers to all the problems dictated by the North", continued Professor Cherskiy, "but many important steps have already been taken. The result of one of the important works lies in your hands..."



Scientists at the Institute proposed a complex solution: a new material, a new design for the parts and technology for production. Moreover, the technology is waste-free.

Before me lies a part to be--a handful of gray powder. It feels like finely milled flour--the particle size is measured in microns. Compressed in a press-form, a mixture of fluoro-plastics and compositions based on them is baked like a pie by a good housewife, observing the "baking" time and the prevailing temperature. In this manner a part is made of preassigned dimensions that does not require additional working. It is strong and yet plastic. But most important, it is frost-resistant. Packing rings such as these will not let you down, will serve you faithfully and long.

Incidentally, the effect is already well known. The innovation received a favorable evaluation by production engineers of the auto-transport base of the union "Yakutugol". The annual savings from its introduction exceeds 80,000 rubles.

At the Institute of Physical-Technical Problems of the North, they have not forgotten about the excellent electrical insulating properties of this polymer. The substitution of traditional ceramic and glass high voltage insulators, which quickly lose their necessary properties in a cold climate, was the next suggestion of the scientists. The polymers have so many advantages: lightweight, strong and unbreakable. Their use will simplify the laying of electric power transmission lines.

At this time experimental samples of the frost-resistant polymeric insulators are being tested at "Yakutskenergo" on operating electric power lines. As it developed, they bear unexpected profits. For example, insulation garlands may be eliminated making it possible to increase the length between supports and to decrease the width of the cross-holes.

Or, take the problem of permafrost. How is one to build an irrigation system on such ground? The "ice sphinx" will distort metal pipes buried in the ground. It is another matter with polymeric pipes. Permafrost will not break or tear them. An experimental section was built at Sovkhoz imeni Ammosov, Namskiy Rayon, Yakutsk ASSR. It is estimated that 756,000 rubles will be saved on every 600 hectares by using this type of pipe.

Plastic channels can also carry hot water to supply industrial and residential buildings. Frost-resistant pipes will also help to prevent accidents in severe cold, reducing to a minimum the risk formerly associated with the use of metal steam lines.

Of course one single research center cannot cope with all of the problems associated with the struggle with cold. Joining of forces becomes necessary. In the interests of accelerating the mastery of natural resources in regions of the North and the Far East, scientific organizations of Siberia introduced to the Presidium of the USSR Academy of Sciences a proposal to create a section on "Wear-Resistance of Machines Under Conditions of Cold Climate",

based at the Institute of Physico-Technical Problems of the North. Several months ago the Presidium of the USSR Academy of Sciences adopted a resolution on the organization of such a section.

Scientific research will now be conducted more effectively. And if today, designs using polymers for dependable service of machines in the Arctic that do not wear out seem somewhat fantastic, then surely tomorrow they will become a reality. The above themes are concrete research trends earmarked for the immediate future.

83440972

CSO: 1841/162

UDC 678.744

EFFECT OF VARIOUS PARAMETERS OF CONTINUOUS PREPARATION PROCESS OF ETHYLENE VINYL ACETATE COPOLYMERS ON THEIR MOLECULAR MASS DISTRIBUTION

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 1, Jan 84  
(manuscript received 13 May 82) pp 194-196

TERTERYAN, R.A., IVANOV, V.I., ITSIKSON, L.B., SHAROV, A.G. and FILIPPOV, A.A.,  
All-Union Scientific Research Institute of Petroleum Processing

[Abstract] Copolymerization experiments were performed under laboratory conditions modelling continuous process under high pressure. Both a tubular polymerizer and a reactor with stirring mechanism were used. Evaluation of the principal parameters led to development of empirical equations for  $\bar{M}_w$  (average mass-molecular weight) and  $\bar{M}_N$  (average numerical molecular weight) as functions of pressure, temperature, concentration of vinyl acetate (VA) and concentration of tertiary butyl peroxide (t-BP):

$$\bar{M}_w = 68990 + 374 P - 212 T - 514 [VA] - 53 \times 10^5 [t-BP] \text{ and } \bar{M}_N = 39620 + 89 P - 95 T - 290 [VA] - 45 \times 10^5 [t-BP]. \text{ Figures 3; references 5: 3 Russian,}$$

2 Western.  
[163-7813]

UDC 541.183:615.7

STUDY OF LOW TEMPERATURE CARBONIZATION OF POROUS COPOLYMERS OF STYRENE AND DIVINYLBENZENE

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 1, Jan-Feb 84  
(manuscript received 19 May 83) pp 23-27

ALEYNIKOV, V.G., BURUSHKINA, T.N., STAVINSKIY, V.B., KOLYCHEV, V.I.,  
KISLITSYN, N.A. and REZONENKO, V.F., Institute of Physical Chemistry, UkSSR Academy of Sciences

[Abstract] The effect of the composition of gaseous medium on styrene-divinyl-benzene (SDVB) copolymer coking was investigated, concentrating on the role of oxygen in the conversion of SDVB into carbonaceous material.

It was shown that basic conversion of the polymer occurred in a rather narrow temperature window (200-420°C). The coking ability of both macroporous and gel copolymers decreased with decreased crosslinking of the test materials. Carbonization of SDVB copolymers was accompanied by decrease of the size of their macroparticles due to the loss of mass as well as due to contraction of this material. Partially carbonized materials showed a smaller volume of pores than the starting copolymer; the greatest pore volume was achieved with the least crosslinked sample. Figures 8; references 11: 7 Russian, 4 Western. [166-7813]

UDC 541.64

#### FORMATION OF FIBRILLATED FILMS FROM MIXED POLYMER MELTS: POLYCAPROAMIDE-POLYSTYRENE, POLYCAPROAMIDE-POLYETHYLENE

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 1, Jan-Feb 84  
(manuscript received 17 Sep 83) pp 63-64

BOYKO, V.I., KTILP [Kiev Technological Institute of Light Industry]

[Abstract] Experiments performed showed it to be possible to obtain fibrillated films from polymer mixtures consisting of polycaprolactone-polystyrene (PCA-PS) and PCA-polyethylene (PE). These films consist of matrix-fibrillar systems in which PCA, PS and PE are found in form of "fibrilles" with specific composition of the components. Figure 1; reference 4: (Russian).  
[166-7813]

UDC 541.64

#### FEATURES OF CHAIN GROWTH AND FRACTURE DURING GRAFT POLYMERIZATION OF METHYLMETHACRYLATE ON INORGANIC MATERIALS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 274, No 3, Jan 84  
(manuscript received 19 May 83) pp 655-657

STEPANYAN, A.O., ZAREMSKIY, M.Yu., OLENIN, A.V., ZUBOV, V.P. and KABANOV, V.A., corresponding member, USSR Academy of Sciences, Moscow State University imeni M.V. Lomonosov

[Abstract] Radical-polymerization is a promising method for obtaining grafted polymers on solid inorganic materials. The present article reports on graft polymerization of methylmethacrylate (MMA) on silicagel, silochrome, macroporous glass and Aerosil. Before polymerization the silicons were treated with methylvinylchlorosilane. In all systems, the molecular weight of the grafted polymers increased as reaction time was lengthened. A post-effect indicated that at least part of the growing radicals were unable to participate in the bimolecular chain fracture reaction. The presence of "live"

radicals made it possible to obtain both grafted polymers and grafted block-polymers after additional introduction of a second monomer. No other additives were needed to achieve a directed synthesis of grafted polymers and block-polymers. Figure 1; references 4: 3 Russian, 1 Western. [154-12131]

UDC 541.64:546.273

#### ONE MANNER OF TRANSITION FROM INORGANIC POLYMER STRUCTURE TO ORGANIC STRUCTURE

Ivanovo KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA in Russian Vol 27, No 1, Jan 84 (manuscript received 10 Mar 82) pp 92-95

TARASEVICH, B.P., SIROTKIN, O.S. and KUZNETSOV, Ye.V., Department of Plastics Technology and Department of Inorganic Substance Technology, Kazan Chemical and Technological Institute imeni S.M. Kirov

[Abstract] Growing interest for combinations of organic and inorganic polymers, such as reinforced plastics and laminated products, led the authors to consider approaches other than common filling processes for joining the differing structures. Gaseous-phase grafting polymerization of a  $B_2O_3$  monomer on inorganic substances such as asbestos, glass or ceramics, lies at the heart of the procedure presented. Study results showed that the kinetic curve of sorption and graft polymerization with thermally-initiated reaction  $\geq 900K$  had linear, transitional and balanced sectors that were related to the duration of synthesis. The resulting glass-like product was amorphous under X-rays, while infrared spectra showed formation of a copolymer containing borosiloxane bonds. Lamine laser mass-spectrometric analysis confirmed a gradient transition from the original inorganic structure through various intermediate stages to a glass-like boron polyanhydride on the surface. Various active fillers were also found useful in epoxy-phenol and epoxy-carbamide polymers. Figures 4; references 9: 8 Russian, 1 Western. [168-12131]

UDC 677.463.004.12

#### STUDY OF TOLUENE SORPTION BY GRAFTED COPOLYMERS OF POLYAMIDE-6 WITH STYRENE

Ivanovo KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA in Russian Vol 27, No 1, Jan 84 (manuscript received 9 Mar 82) pp 96-99

PAVLYUCHENKO, G.M., SIDERKO, V.M., KAPUTSKIY, F.N. and IVASHKEVICH, L.S., Department of High-Molecular Compounds and Colloidal Chemistry, Belorussian State University imeni V.I. Lenin

[Abstract] While numerous new chemical methods for initiating and synthesizing grafted copolymers have been demonstrated in recent years, little study has been made of sorption properties. The present article reports on solvent

sorption by polymers that are chemically bonded with another polymer, based on the example of polystyrene-polyamide-6 (PS-PA). The initial object of study was PA in fiber form to which 8% and 60 % PS had been grafted using ultraviolet irradiation. Toulene, the sorbate, was added in a vacuum device at 323, 333, 353, and 363K. Results showed that the initial PA absorbed toluene at 323K, but 8% PS somewhat reduced its sorption capacity. With 60% PS, there was a sharp rise in sorption of the grafted copolymer. The PS changed the surface structure of PA while also causing the formation of a new micro-structure. Further analysis revealed a loose combination of PS macromolecules in the copolymer with 60% PS. Figures 3; references 5 (Russian). [168-12131]

UDC 678.664

#### DEVELOPMENT OF REPAIR TECHNOLOGY FOR LARGE-SIZED OBJECTS MADE OF CAST MONOLITHIC POLYURETHANES

Moscow KAUCHUK I REZINA in Russian No 1, Jan 84  
(manuscript received 17 Dec 81) pp 23-24

KOLESNIKOV, N.M. and MIKUL'CHIK, I.D., Scientific Research Institute of Rubber Industry

[Abstract] Surface defects on large-sized objects made from monolithic cast polyurethane are costly and can be repaired by cutting out the defect (bubble, cavity, side inclusion), degreasing the surface and filling with polyurethane composition. Samples having such bonds were tested for both tensile strength and shear stress. Better results are obtained if the repair is made in two steps. In those cases where the hardening process is lengthy, and where the two-step method is not possible, the defective area may be heated with hot air to 175°-185°C before being filled with the polyurethane composition. Figures 3.  
[151-83440972]

UDC 677.052.78.677.494

#### TEXTURIZING SYNTHETIC FIBERS IN STREAM OF HEATED GAS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 84  
(manuscript received 10 Mar 83) pp 18-19

VOLKHONSKIY, A.A. and LEV, S.G.

[Abstract] Texturizing thermoplastic synthetic fibers in a stream of hot air is one way of imparting twist to a fiber. The fiber is stretched on heated rollers and force-fed into an ejector from which it is fed in a stream of hot

air into an embossing chamber. After pneumotexturizing, the thread is twisted in a hot air stream at 30-40 meters per second. High speeds are possible due to the lack of contact with moving mechanical systems. Test runs on capron rug fibers show that output speeds of 2000 meters per minute require that the air temperature must exceed the melting point of the fiber. Figures 5; references 3: 2 Russian, one Western.  
[178-83440972]

UDC 677.494.675-96.021.12

#### SORPTION OF WATER VAPORS BY CHEMICALLY MODIFIED POLYAMIDE FIBER

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 84  
(manuscript received 23 May 83) pp 20-21

LITVINOVA, T.A., BOGACHEVA, T.I., ANDRICHENKO, Yu.D. and DRUZHININA, T.V.

[Abstract] A study was made of the changes in sorption properties of chemically modified polyamide fiber in comparison to analogous properties of capron fibers and the difference in sorption characteristics of modified polycapronamide fiber containing new type functional groups as compared to the properties of hydrophilic natural and artificial fibers, under changing pressures of water vapor. Analysis of adsorption isotherms shows that modified polycapronamide fiber adsorbs water vapors analogous to cotton over a wide range of relative humidity. The increased sorption capacity is explained as being due to the increased number of active hydrophylic functional groups and the volume of sorption pores. Figures 2; references 5: (Russian).  
[178-83440972]

UDC 677.027.625.162

#### UTILIZING BORON-ORGANIC COMPOUNDS FOR PREPARATION OF FIRE-RESISTANT POLYCAPROAMIDE FIBERS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 84  
(manuscript received 26 Sep 83) p 26

EFROS, A.V., BUTYLKINA, N.G., KRYUCHENKOVA, L.V. and TYUGANOVA, M.A.

[Abstract] A study was made of the possibility of using boric acid polyester containing boron, chlorine and nitrogen as a fire-resistant additive to polycaproamide fibers. A hydrolytically-stable polyester was synthesized by a previously-described method from ethanolamine and 3,3-dichloromethyloxacyclobutane. Gas chromatography showed that pyrolysis of polycaproamide fibers treated with the boron polyester results in a lower yield of caprolactam. The study shows that by changing the chemical composition of the polyester, especially the chlorine to boron and nitrogen to boron ratios, it is possible to increase effective fire-resistance. Optimum ratios are 0.15 for Cl:B and 0.25 for N:B. Figure 1; references 6: 5 Russian, 1 Western.  
[178-83440972]

UDC 677.022.782

#### TEXTURIZING FEATURES OF COMPLEX CARBIMIDE THREADS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 84  
(manuscript received 3 May 83) pp 32-33

IVASHOVA, V.A., USENKO, V.A., RODIONOV, V.A., ZHARKOVA, M.A., RASSOLOVA, E.A.  
and BUNAREVA, Z.S.

[Abstract] The effect of the degree of orientational stretching of carbimide threads on their texturizing process was studied. The samples studied has a linear density of 29.4 tacks consisting of 80 filaments. It was established that in order to increase the capability of carbimide threads to texturizing, threads having 600% orientational stretching should be used. References 5 (Russian).

[178-83440972]

UDC 677.061.2

#### STRETCHING TEXTURIZED CAPRON THREADS ON SINGLE PROCESS FRICTION MACHINES

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 84  
(manuscript received 15 Sep 83) pp 52-53

RADCHENKO, I.V. and USENKO, V.A.

[Abstract] A study was made of the effects of the degree of stretching on the physical and mechanical properties of texturized capron elastic thread having a linear density of 2.2 tacks as produced on a single press friction machine. It was found that by using a stretch factor of 3.20 it was possible to obtain texturized elastic thread of 2.2 tacks having uniform physical and mechanical properties with less tearing during production. Figures 3; references 2 (Russian).

[178-83440972]

UDC 677.051.12:677.021.123.644:677.464

#### MULTICOLORED THREADS

Moscow KHIMICHESKIYA VOLOKNA in Russian No 1, Jan-Feb 84  
(manuscript received 10 May 83) pp 53-54

YATSKYAVICHENE, A.I., TSINELENE, M.A. and SAKALAUŠKAS, Z.Yu.

[Abstract] Coloring chemical fiber in bulk is more economical than dyeing the fabric and results in less contamination of waste water. However, the color assortment at any one production facility is not very high. One



solution to this problem is production of two-color double component thread from different color polymer solutions. This allows widening of the color assortment of bulk colored thread by simple installation of some ducts and metering pumps without adding additional blenders, filter presses or other industrial equipment. Figures 2; references 3: 2 Russian, one Western. [178-83440972]

UDC 661.729.07(088.8)

# POLYMERIZATION OF VINYL POLYMERS INITIATED BY ACETYLENIC CHLORINE-CONTAINING PEROXIDES

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 1, Jan-Feb 84 (manuscript received 30 Jun 83) pp 72-76

TISHCHENKO, I.G., STEPIN, S.G. and MOROZOV, I.M., Belorussian State University imeni V.I. Lenin and Vitebsk State Pedagogical Institute imeni S.M. Kirov

[Abstract] The acetylenic peroxides 2,5-dimethyl-2,5-di-(1-hydroxy-2,2,2-trichloroethylperoxy)hexyne-3 (I) and 1,2-[1,1'-di(1-hydroxy-2,2,2-trichloroethylperoxy)acetylene (II) were prepared by reaction of the corresponding dihydroperoxides with chloral hydrate in a mixture of hexane and benzene in the presence of anhydrous calcium chloride. Since chlorine-containing vinyl polymers have low flammability, a study was made of the initiating activities of the above peroxides in the polymerization of styrene and methylmethacrylate, since this type of initiation also introduces chlorine to the polymer. This could lower or even eliminate the use of antipyrenes such as antimony trioxide or chloroparaffins in the polymer composition. Kinetic data presented show that peroxide (I) surpasses peroxide (II) as far as initiating activity of methylmethacrylate and styrene is concerned. Figure 1; references 5: 2 Russian, 3 Western. [179-83440972]

UDC 66.085.3:628.543

RADIATION PURIFICATION OF EFFLUENT FROM CYANIDES

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 84 pp 23-24

PETRYAYEV, Ye.P., KISELEVA, L.A., KOVALEVSKAYA, A.M. and SHLYK, V.G.

[Abstract] The possibility of removing cyanides in the effluent from chemical industrial plants by means of  $\gamma$ -irradiation was investigated on the effluent from the plant producing acrylic acid nitrile (AAN). Irradiation of effluent containing 15-100 mg/l  $\text{CN}^-$  ions with 0.45 Mrad dose led to a 90% breakdown of  $\text{CN}^-$  ions. The breakdown intensity was greater with increased concentration of the  $\text{CN}^-$  ions and with temperature elevation of the effluent being treated. Analysis of the products of cyanide radiolysis performed on sodium cyanide showed that effluents could be purified effectively by  $\gamma$ -irradiation alone at a cost comparable to less-effective chemical purification. Figures 3; references 10: 7 Russian, 3 Western.  
[165-7813]

REGULATION OF TECHNOLOGICAL CHARACTERISTICS OF BUTYL RUBBER PACKED WITH ASBESTOS ADDITIVES

Kiev KHMICHESKAYA TEKHNLOGIYA in Russian No 1, Jan-Feb 84  
(manuscript received 25 Jun 83) pp 29-30

KRUGLITSKIY, N.N. and KUZNETSOV, A.D. (deceased), IKKhKhV [expansion unknown],  
UkSSR Academy of Sciences

[Abstract] The effect of asbestos additives on the formation of structures in a packed butyl rubber was studied. It was shown that with an increase in the content of asbestos in the system (from 2.0 to 8.0%) a slight variation in slow elasticity was observed (0.83-0.97) along with lower static plasticity and fluidity of the system indicating that the asbestos additive creates new centers of coagulation structuralization, increases the strength of single contacts and fills the spacial network. The results obtained pointed out the methods for obtaining non-flowing compositions based on packed butyl rubber. Development of the function  $E = f(c)$  makes it possible to determine the relative modulus of deformation for any concentration of solid phase, which reflects the energy needed for the breakdown of unit volume of the system. This formula may be used in calculations for novel technological equipment. Figures 3; references 5 (Russian).  
[166-7813]

UDC 678.4.028.273

INFLUENCE OF LATTICE THICKNESS OF RUBBERS OBTAINED UNDER HIGH PRESSURE ON THEIR PHYSICO-MECHANICAL PROPERTIES

Moscow KAUCHUK I REZINA in Russian No 1, Jan 84  
(manuscript received 5 Mar 82) pp 6-10

ZUYEV, Yu.S., YUROVSKAYA, I.S., ZHAROV, A.A. and ZHULIN, V.M., Scientific Research Institute of Rubber Industry

[Abstract] High temperature and pressure facilitate crosslinking of unsaturated rubbers without the use of vulcanizing agents and result in rubbers with improved properties and greater modulus and hardness, and less

residual deformation. Since such rubbers have high lattice thickness, a study was made to discern how vulcanizate properties change with increasing lattice thickness, and if the properties of high pressure vulcanizates differ from conventional ones with the same lattice thickness. The results showed that the high pressure vulcanizates displayed a higher level of properties as compared to conventional vulcanizates owing to a greater number of physical nodes formed at high pressure. Also, high pressure vulcanization results in greater lattice thickness and hence rubbers with unique properties. Figures 3; references 9: 8 Russian, 1 Western.  
[151-83440972]

UDC 678.4/7:004.62

#### PREDICTING USEFUL LIFE OF POLYAMIDE BASE RUBBER FABRIC

Moscow KAUCHUK I REZINA in Russian No 1, Jan 84  
(manuscript received 25 Oct 82) pp 29-31

KUZ'MINA, S.S., BORODKO, T.V. and VAKORINA, M.V., Scientific Research Institute of Rubbery Industry, Leningrad Branch

[Abstract] In fabrics used to make membranes, the rubber coating is very thin (not over 0.15 mm) and therefore more vulnerable to aging than other systems such as tires, employing greater amounts of rubber. A study was made of the behavior of thin rubber fabrics at elevated temperatures in the free state to establish parameters responsible for aging, and to determine their critical values so that the useful life of rubber fabrics during storage can be predicted. Membrane fabric 0.4 (OST 38.95.104-76) reinforced with polyamide fabric (art. 56023) impregnated with butadiene-nitrile rubber (SKN-26M) was chosen since this material is widely used for making sensitive membranes. Experimental results obtained after 12 years aging compared favorably with theoretically obtained values. A graph is presented which can be used to determine the degree of aging of the fabric after a given time, and its longevity due to aging at elevated temperatures. Figures 3; references 7: 6 Russian, 1 Western.  
[151-83440972]

UDC 614.841.41

#### FIRE HAZARD OF RUBBERIZED FABRICS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 84  
(manuscript received 21 Jun 83) pp 41-43

YEVDAKOV, A.P., VOGMAN, L.P., GLOBUS, M.Ye. and BAYBAZAROV, R.Z., VNIIMO [All-Union Scientific Research Institute for Fire Protection?] USSR Ministry of Internal Affairs

[Abstract] The state of the art in fire-resistant and fire-proof rubber and rubberized fabrics has been advanced considerably in recent years largely owing to the more rigid requirements for air-tight buildings employing

rubberized fabrics. Fire tests of air-tight structures show that the flames along the periphery of openings are bent outwardly due to the increased pressure from within. Flammable polyamide textiles (art. 56026 and 56023) are the base fabrics currently used in air-tight buildings, and they must be protected with fire-resistant rubbers. Various combinations of fire-resistant and fire-proof rubbers and materials are presented which also are freeze-resistant and can be used for air-tight construction. Figures 3. [151-83440972]

UDC [678.762.3:678.763.2]:547.551.2:539.378.3

EFFECTS OF TECHNICAL GRADE CHARCOAL DG-100 AND ZINC OXIDE ON PROCESSES OF MASS TRANSFER OF SULFENAMIDE TS IN MULTILAYERED RUBBER OBJECTS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 84  
(manuscript received 3 Mar 83) pp 13-15

GRACHEVA, N.I., KORNEV, A.Ye., GINZBURG, L.V. and POTAPOV, Ye.E., Moscow  
Order of Labor Red Banner Institute of Fine Chemical Technology imeni  
M.V. Lomonosov

[Abstract] Recent research has shown that mass transfer of low molecular weight ingredients in rubber mixtures from one structural element to another in laminated rubber objects has a great effect on the strength of the adhesion joints. An effort was made to trace the migration of the vulcanizing accelerator sulfenamide Ts through the contact boundaries between rubber mixtures having varying degrees of filling with technical grade charcoal and zinc oxide. Experimental data show that mass transfer results in a broad "transport zone" governed by the concentration gradient. High filling of the system SKI-3 + SKD with technical grade charcoal has no significant effect on mass transfer of sulfenamide Ts from the unfilled rubber. A mixed type filler (50 parts DG-100 and 20 parts zinc oxide) has a synergistic effect on the mass transfer process. Figures 3; references 10: 9 Russian, 1 Western. [151-83440972]

UDC 543.061.628.1.543.544

CHARACTERISTICS OF WASTE EFFLUENT IN EPOXY RESIN PRODUCTION

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3,  
May-Jun 83 pp 155-160

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Water Supply, Sewage and "hydrotechnical Buildings and Engineering  
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[Abstract] Waste effluent was analyzed from three different enterprises  
manufacturing epoxy resins. The samples were taken directly from the  
condensation reactors and resulted from the first and second washings of  
the resins. Toluene, epichlorohydrin, allyl chloride, chloroform,  
dichloropropane, etc., were measured by gas chromatography. The results  
showed that epoxy resin effluent has a significant content of both dissolved  
and suspended matter. The chief contaminants are toluene, volatile  
(chlororganic) and non-volatile (glycerine and polyglycerides) organic  
substances, and mineral salts (sodium chloride). Presence of matter in the  
effluent that is difficult to oxidize was confirmed. Figures 2; references  
6 (Russian).  
[155-83440972]

UDC 541.183

DECONTAMINATION OF DIVINYL PRODUCTION WASTE EFFLUENT FROM COPPER SALTS

Baku DOKLADY AKADEMII NAUK AZERBAYDZHANSKOY SSR in Russian Vol 39, No 8,  
Aug 83 (manuscript received 20 Jul 81) pp 37-40

ANNAGIYEV, M.Kh., ZUL'FUGAROV, Z.G., MAMEDOV, I.I., DZHAVADOV, M.N. and  
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[Abstract] Clinoptilolite, a zeolite from the Aydag deposit in Azerbaijan,  
is used to extract copper-amino complex from the waste effluent resulting  
from divinyl production. Optimum particle size appears to be 3-5 mm. Repeated  
adsorption to 60 cycles showed that the pore size increased with use making  
it optimal for copper-amino complex extraction. The extracted copper may  
be recycled for more divinyl production. A comparison of test data before

and after adsorption showed that the adsorbability of clinoptilolite and its structure did not change. Figures 2; references 1 (Russian).  
[171-83440972]

UDC 628.162.4

#### OPTIMIZATION OF WATER TREATMENT AT WATER SOFTENING STATIONS OF BRANCH ENTERPRISES

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 84  
(manuscript received 18 Mar 83) pp 44-46

SHIMKO, I.G., SHMATOVA, V.V., ROMANOVA, T.A., VISHNYAKOVA, Ye.V. and MALYAR, E.I.

[Abstract] Specialists of the All-Union Scientific-Research Institute of Artificial Fibers conducted an inspection of water softening stations at chemical fiber production enterprises in Kiev, Klin, Sokol, Cherkass, Ryazan, Krasnoyarsk and Svetlogorsk. All stations employ the same system, i.e., coagulation with aluminum sulfate, mechanical filtration, and sodium cationization. However, not all stations had chemical control at each softening stage, nor was there reagent control. The inspection team made several recommendations to increase efficiency such as installation of meters on each first stage filter to make sure that they operate at less than 8-10 m<sup>3</sup>/hr. This will decrease the number of filters working at the same time and hence also the number of regeneration stages. Implementation of the recommendations will reduce reagent consumption, lower salt content in the water, and could result in an annual savings of 25,000-30,000 rubles at a typical water softening station. References 5 (Russian).  
[178-83440972]

UDC 628.335:628.345

#### FLOTATION TREATMENT OF INDUSTRIAL WASTE WATERS WITH AID OF HYDROPHOBIC ADSORBENTS

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 2, Feb 84 pp 24-25

GLADKIKH, Yu.F., candidate of technical sciences, Far East Scientific-Research Institute of Mineral Resources and SODNOMOV, B.G., candidate of chemical sciences, Khabarovsk State Medical Institute

[Abstract] Ash from electric power stations can be made into a hydrophobic adsorbent by treatment with silicon-organic liquid GKZh-94 emulsified with soap and water. Tests show that this product can be used to effectively treat industrial waste water to remove oils, phenols, naphthenic acids, etc., by flotation. Figures 1; references 6 (Russian).  
[176-83440972]

UDC 677.021.125.26-913.1:677.464

FORMATION OF ACETATE FILAMENTS IN NITROGEN STREAM

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 84  
(manuscript received 9 Mar 83) pp 28-29

MUKHIDDINOV, D.N., LUZHANSKIY, D.M., AZIZOV, E.A., MUKHAMMEDOV, Kh.Y. and  
ASKAROV, M.I.

[Abstract] Nitrogen is substituted for air as heat carrier in the acetone vaporstream mixture during acetate filament production so that a higher concentration of gas may be used safely. The filament was formed at temperatures ranging from 70° to 130°C and acetone vapor concentrations of 0.04 to 0.14 kg/m<sup>3</sup>. Optimum parameters are 115°-125°C nitrogen temperature, 11-13 m<sup>3</sup>/hour nitrogen throughput velocity and 0.075-0.85 kg/m<sup>3</sup> vapor concentration at the filter. Under these conditions, 240 kg of acetate textile filament was experimentally produced at the Fergan plant and worked into fabric at the Margilan Silk Combine. The fabric was first grade according to GOST standards. There was also less tearing and interbobbin defects during the weaving.

[178-83440972]



UDC 542.947:666.112

LEACHING KINETICS OF LIQUEFYING SILICATE GLASSES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 1, Jan 84  
(manuscript received 10 Jun 82) pp 45-49

MESHKOVSKIY, I.K.

[Abstract] The goal of the present work was to investigate leaching kinetics of a two-phase silicate glass, concentrating on the specific situation in which the dissolving areas are in contact with each other but with only a slight overlap. To simplify the solution of the problem, a modelling assumption was made that the diffusion coefficients of the protons in the non-leached phase and in the leached phase whose pores were filled with the solution were similar. A simple monodimensional model was proposed consisting of three phases: I- solvent, II- leached layer and III- undissolved glass. The function  $\xi(t)$  which represents the shift to the interphase border separating the leached glass from the nonleached glass was analyzed, developing the formula for a determination of  $\xi(t)$  in a more precise fashion than it was possible prior to this study; the newly developed formula is  $\xi(t) = A_0 \sqrt{t \ln t}$ . Figures 2; references 8 (Russian). [163-7813]

UDC 539.219.3

MEASURING COEFFICIENT OF DIFFUSION OF SILVER IN POLYCRYSTALLINE SUPERIONIC CONDUCTOR  $Ag_xTiS_2$

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 1, Jan 84  
(manuscript received 12 Jan 83) pp 75-78

UKSHE, A.Ye., SHERSTNOVA, L.V. and ATOVMYAN, L.O., Chernogolovka Department, Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] The ion diffusion coefficient is an important characteristic of intercalate compounds because the ionic transport of a metal interjected in an intercalate takes place by diffusion. Measurements were conducted at 20°C in a special cell consisting of powdered  $Ag_xTiS_2$ , solid electrolyte  $Ag_4RdI_5$  and electrodes consisting of mixtures of Ag and  $Ag_4RbI_5$  powders in

2:1 ratio. The results showed that the diffusion coefficient of Ag<sup>+</sup> ions in phases I and II of the intercalate Ag<sub>x</sub>TiS<sub>2</sub> is significantly lower than the diffusion coefficients of the same ions in the solid Ag<sub>4</sub>RbI<sub>5</sub>. Nevertheless, it is still sufficiently high to confirm the presence of rapid ionic transport in these materials. Figures 2; references 10: 5 Russian, 5 Western.

[149-83440972]

UDC 535.37:542.65+535.379:541.459:542.971

CHEMILUMINESCENCE IN CATALYZED DISINTEGRATION OF PEROXIDES BY CRYSTALLINE SUBSTANCE SURFACE AS CAUSE OF CRYSTALLOLUMINESCENCE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 274, No 3, Jan 84  
(manuscript received 3 May 83) pp 658-661

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[Abstract] Studies of crystalloluminescence can be traced as far back as 1785, but its causes remain uncertain. The possibility of direct conversion of the energy of crystallization into light rays remains problematical. The authors have observed bright luminescence with the naked eye during precipitation of terbium nitrate from hot solutions in acetone in the presence of chloroform, and higher temperatures brought increased luminescence. Both sensitive and catalytic processes seem to be involved. Further study of this phenomenon showed it to be typical not only of metal salts such as Ru<sup>2+</sup> and Tb<sup>3+</sup>, but also for molecular crystals. Traces of peroxide in organic and mixed systems were instrumental in explaining crystalloluminescence during thermal decomposition of peroxides by freshly-formed crystalline surfaces of certain organic and inorganic compounds. Figures 2; references 15: 7 Russian, 8 Western.  
[154-12131]

CSO: 1841

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